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no.6

THE PRACTICAL PHOTOGRAPHER

(LIBRARY SERIES)

EDITED BY REV. F. C. LAMBERT, M.A.

NUMBER 6

The Pictorial Work of
Ernest R. Ashton.

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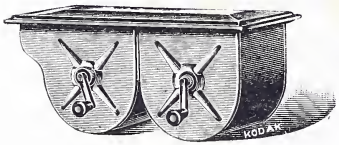

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Contents of Our Next Number.

The seventh number of the present (Library) Series of *The Practical Photographer* will deal with the important practical subject of **The After-Treatment of the Negative,** *e.g.*, Intensification, Reduction, Spots, Stains, Defects, etc. (*Ready April 1st.*)

Our Eighth Number will deal fully with the increasingly popular subject of **Hand Camera Work.** Choice of a Camera: Its Use, Difficulties, Hints, Dodges, etc. *(Ready May 1st.)*

Other Numbers in active preparation will be devoted to **Platinotype, Carbon, Gum-bichromate, Architecture, Landscape, Still Life, Telephotography, etc.**

Hints for Intending Contributors.

The Editor will be pleased to carefully consider MS. bearing on any of the subjects announced. Preference will be given to MS. characterised by the following features :—

1. New or little known methods; formulæ personally tested.

2. Short sentences and simple language, with diagrams when needed.

3. Brevity so far as is consistent with clearness. The first and last pages of the MS. should bear the sender's name and address. The approximate number of words should be stated. Contributors may, if they please, send a brief outline or synopsis of their proposed contribution.

The Editor cannot undertake any responsibility whatever in connection with MS., but if stamps are sent for return postage, he will endeavour to return as quickly as possible any MS. not accepted for publication. MS. should reach the Editor not later than **six weeks** before date of publication.

Intending contributors will also find that it saves themselves trouble if they will send to the Editor an *outline* of their proposed communication at the earliest possible date, so that arrangements may be made to avoid overlapping by two or more contributors saying the same thing. In this first communication any proposed diagrams may be merely rough sketches.

In general it is well to put any drawings or diagrams on separate sheets, and not interpolate them with the matter.

The MS. pages (which may preferably be typewritten) should have a clear margin of quite an inch left blank along the left-hand side of the page.

NOTE.—It would frequently save disappointment and the return of MS. if authors would state their willingness for extracts to be made from their contributions if the contribution cannot be accepted in its entirety owing to overlapping or duplication of portions by other contributors.

Criticism of Prints.

It is our intention to make the criticism of prints a special feature in our pages. The Editor will give his personal careful attention to this matter, and will aim at making every criticism a practical, interesting, and instructive object-lesson. By paying attention to the hints thus given, often a poor print may be improved and a good print followed by one still better. In order to encourage readers to take great care in the preparation of the prints they send us, we shall offer **Three Prizes of Five Shillings** each for the three best prints sent in each month. The winning prints will not be returned.

Spring Junior Salon.—25th March!

The last day for receiving prints for our Spring Junior Salon is *The 25th Day of March.* A Special Coupon for our Junior Salon Competition will be found in this number. Prints may be of any size, subject, or process, mounted or unmounted. Technical as well as pictorial merit will count. A number of Silver and Bronze Medals and Certificates on Japanese Vellum will be placed at the disposal of the judges, who are **Professor G. A. Storey, A.R.A.**, and the Editor of *The Practical Photographer.*

THE PRACTICAL PHOTOGRAPHER. COUPON No. 11.

Spring Junior Salon.

Name .....

Address .....

.....

.....

WRITE LEGIBLY.

This Coupon Expires March 25th, 1904.

Spring Junior Salon, 1904.

Several Silver and Bronze Plaques and Certificates on Japanese Vellum will be placed at the disposal of the Judges.

1.—Each competitor may send in one, two, or three (but not more) prints.

2.—The prints may be of any size, subject, printing process, mounted or unmounted, but in the former case marks will be assigned for tastefulness of colour, style, titling, etc.

3.—A picture that has previously gained an award in any *public* exhibition or competition is not eligible.

4.—No person can take two awards. Awards will be made for individual prints, not sets.

5.—Under no conditions will any of the prints be returned.

6.—The Editor reserves the right to reproduce any print sent in, whether it gain an award or not.

7.—Each print must bear on the back legibly written the name and address of the competitor, title of picture, and printing process. (It is also desirable to add the name of the plate used and exposure given.)

8.—A selection of the prints will be reproduced, together with constructive, suggestive, and helpful criticisms.

9.—The Proprietors of *The Practical Photographer* have most generously left the number of Silver and Bronze Plaques and Certificates entirely to the discretion of the Judges, who will be guided in this matter by the number and quality of the prints sent in.

10.—Each competitor must send *with* his prints the accompanying coupon. Prints may be sent in any time up to and including March 25th, 1904, and should be addressed :—

"Junior Salon Competition,"
Messrs. Hodder & Stoughton,
27, Paternoster Row, London, E.C.

Three Practical Hints.

1.—Look through your negatives and select the best three or four.

2.—Carefully make (at least) two prints from each negative and select the best print.

3.—Before finishing the print have at hand No. 4, *The Practical Photographer*. Before Trimming, read pages 7-9, 16; Choice of Mount, 13-14, 17-20, 21, 24, 37, 41; Choice of Title, 38-40; Inscribing the Title, 43-44; Mounting and Mountants, 11-14, 22-23, 29-30, 64, etc. (N.B.—A small matter—like careless trimming, etc.—*may* make the difference of a "Silver" or "Bronze" to you.)

This Coupon Expires March 31st, 1904.

THE PRACTICAL PHOTOGRAPHER. COUPON No. 12.

Prints for Criticism.

RULES.

1. Write legibly, on one side of the paper only.
2. Put your name, address, and a number on the back of each print, and enclose this coupon.
3. Do not send more than three prints with one coupon.
4. State the *Month*, *Hour*, *Light*, *Plate Speed*, *Stop*, *Exposure*, *Developer*, *Printing and Toning* process employed.
5. If prints are to be returned, a stamped and addressed label or envelope *must* be sent **with the prints.**
6. The Editor reserves the right of reproducing any print sent in for criticism.
7. Prints should be addressed :—THE EDITOR OF *The Practical Photographer* (Print Criticism), 27, PATERNOSTER ROW, LONDON, E.C.

THE PRACTICAL PHOTOGRAPHER. COUPON No. 13.

Developing Competition.

Name .....

Address .....

WRITE LEGIBLY.

This Coupon Expires April 30th, 1904.

Developing Competition.

A Silver and Bronze Medal and Certificates will be placed at the disposal of the Judges.

1. This competition is designed to direct the attention of readers to the subject of Development of Negatives.
2. Prints from the negatives and not the negatives are to be sent to us.
3. The Winning Prints will not be returned. Others will be returned *if* a stamped and addressed envelope or label be sent **with the prints** and coupon in this number.
4. Each print must be accompanied by a legibly written description of (a) make of plate or film used for the negative, and speed number if possible ; (b) Light ; (c) Stop ; (d) Exposure ; (e) Developing Formula ; (f) Printing Process. Those workers who adopt the timing or factorial system should add time of appearance and factor employed.
5. Competitors may submit one, two or three (but not more) prints with each coupon.
6. The prints may be by any process, mounted or unmounted.
7. Prints may be sent in any time to reach us not later than May 1st, 1904, addressed :—

The Editor of *The Practical Photographer*,
(Developing Competition),
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Kindly mention "The Practical Photographer."

EVENING NEAR THE PYRAMIDS

THE PRACTICAL PHOTOGRAPHER.

Library Series. **No. 6.**

The Pictorial Work of Ernest R. Ashton.

BY THE EDITOR.

MR. ASHTON is a man to be envied, because having set himself a difficult task he has attained a conspicuous measure of success therein. A rapid glance at the representative collection of his work, here reproduced, at once shows us that he is the apostle of sunshine; the pictorial expression of bright warm palpitating sunlight is the key-note of his attractive pictures. Not only has he taught photographers that the rendering of a dazzling range of chiaroscuro is possible for the camera man, but has further shown that there are variations of noonday sunlight. The subtle differences between the sunny glow of Cairo and the burning, blazing light of Calcutta are niceties requiring a discriminating eye, and well-grounded technique for their proper rendering.

This brings us to a matter which will bear repeating, *viz.*, that good craftsmanship must underlie art work of anything more than quite mediocre merit. True, a skilled craftsman is not necessarily an artist, but it would be hard to find an artist in any medium, be it painting, sculpture, music, or any of the sister fine arts, who is not also a skilled craftsman.

Doubtless the reader of this series of *The Practical Photographer* will already have noted that with the work of each sun artist we make a point of reproducing at least one early example of what is commonly called first-rate "technical

excellence," in order to drive home to the young student the lesson that all our front rank pictorial workers have been well grounded in craftsmanship in their early days. It is hoped that this hint will be well laid to heart by those who may be tempted to neglect the craft for the art. To do this is to build on sand and court disaster.

Mr. Ashton's literary contributions to the photographic press are few and far between. But whenever they do appear they always contain sound and reliable advice based on personal experience. It was in 1887 that Mr. Ashton commenced photography with no other help than a shilling handbook. He was then in the Australian bush, where camera clubs and photographic societies and journals are conspicuous by their absence. Looking back on this time of trial of patience, he now feels that being thrown upon his own experimental resources has given him a closer grip of procedure than otherwise might have been the case. In addition to his sojourn in Australia he has visited New Zealand, South Africa, America, Sandwich Islands, West Indies, and been twice round the world. He has visited all the countries of Europe, except Portugal, Turkey and Greece, having seen all the important European picture galleries from Madrid to St. Petersburg, both inclusive. But comparatively lengthy stays in Egypt, Tunis, Morocco and India doubtless have influenced his pictorial preference for the sunny lands. In early days the directness of the Dutch School, and later, the Modern French Painters, have chiefly appealed to his pictorial tastes.

In general, his photographic work is done either with a hand camera or a whole-plate stand apparatus. From these original negatives transparency positives are derived, preferably by the carbon process, which in turn are made to yield 15×12 enlarged negatives. Familiarity with all the usual printing processes affords a choice of medium, though preference is given to carbon or platinum, with strong leanings towards the more flexible gum-bichromate.

His fruitful acquaintance with the gorgeous orient gives special value to his personal experiences. Films are preferred by reason of

their convenience for travel and immunity from breakage. The long range of light and shade call for double coating, and the brilliant colouring demands orthochromatized emulsions with suitable colour filters. Some form of actinometer is advised. The beginner is warned against letting himself be beguiled into under-exposure, for here, as elsewhere, exposure sufficient for registering shadow detail is essential for truthful representation. The worker is advised to stand in the shade when viewing his subject, as it is only in this way that the strong shadows, which viewed in full sunshine, may appear as "Egyptian darkness," are more truly seen to have a subdued glowing tonality which is characteristic of their quality.

The traveller must be constantly on guard against dust in his camera, and plate or film holders. A spare focussing screen of matted celluloid should be carried in those regions where ground-glass is unknown. A few tabloid chemicals can be used for the development of an occasional test plate.

Following our usual custom, we offer a few notes on perhaps not the best known, but the most widely typical of his works taken in the chronological sequence of their production.

Venice.—Truly a daintily graceful composition forecasting those tastes which we see were subsequently to be developed. The long range of tones from the exquisitely carved marble fountain on the one hand to the richer deep shades of the overhanging foliage and partly hidden door on the other, show a mastery of craftsmanship which has not been forsaken in later years. The posing of the figure is not so unconscious as we shall find to be the case in the later examples.

An Arab Household is a figure study showing many features of interest that need no mention, and is also full of useful hints. The use of a dark doorway as a contrasting background should be noted. The figure to our left is possibly a little conscious in pose. But when one remembers the great difficulty of obtaining figure studies at all in lands where the camera is regarded as the materialization of the Evil Eye, such successes as these are quite exceptional.

The Hour of Prayer.—This is a picture which cannot fail to interest every thoughtful reader. The three characteristic attitudes of prayer are well shown. The subdued yet strong light of the mosque is rendered with conspicuous skill. The forceful posing of the three figures with their backs to the spectator leads us to think of that universal desire for communion with the All-Father which overleaps language and race and time—that "something" which all feel at times, though no man can ever hope to express in words, which makes each slowly realize that the great virtues of life are precisely those which no hand can grasp, no tongue can tell, no eye can see, and yet are within and without and around us always and everywhere. Thoughtless men say the days of miracles are past, but a scene like this tells us that there are more things in heaven and earth than are dreamed of in such foolish babblings. The endless variations of outward expression of the universal religious instinct is an endless miracle for all who have eyes to see and hearts to feel.

A Carrene Cafe, makes one catch one's breath by its suggestion of glowing sunshine outside casting deckled patterns of the chequered screen. The scent of the coffee and tobacco hang in the air. A lazy, dreamy feeling pervades the scene, suggesting the retelling of the tales of the Arabian Nights and the dreams of the Lotus Eaters.

One of the Faithful here shown seems a fit companion to the last picture. One can well understand the younger men in the former scene dreamily talking year in and year out and growing grey in the study of the deeper philosophies. The technical photographer will be keenly interested in noting the skilful presentation of the white sunlit turban, with its exquisitely rendered subtle gradations against the natural background of the open doorway. The simplicity of the composition is in artistic harmony with the occupation and expression of the faithful son of Allah.

Evening near the Pyramids shows our artist in a somewhat different but not less interesting vein. The effect is that of the approaching Khamseen, or

dust-storm. In old times men desired to call lands after their own names, and to build vast monuments for their tombs, with the unquenchable desire of being remembered. But their names are forgotten, the great pyramids crumble away and only man as a race remains. The evening of each day is a symbol of the evening of every single life, and of the race, and people. Helios daily drives his cloud chariot from east to west, but never ends his journey. Quite wisely all human figures are omitted from this poetic scene, which is rendered with Mr. Ashton's usual skill.

The Pearl Mosque, Agra, takes us to the land where sunlight is not only dazzlingly bright but is almost savage in its fierceness as though it were jealous of every nook and cranny into which it could not penetrate. Note how the brilliant sunshine makes the buildings in the distance tell out strongly by comparison against what is a brightly glowing cloudless sky. Observe how the zenith sun beating down on the pavement is reflected in warm glow into the darkest recesses of the over-arching masonry in the near parts of the picture.

A Play of Sunlight, Lucknow.—This picture seems to sparkle with brilliant light. Contrasting the posing of the figures in the two last and two first of our series we see how Mr. Ashton has made a great advance. Perhaps there is no more severe test of powers of observation and composition than in this matter of treatment of figures—a subject as wide as it is interesting.

All too soon do we find our space filled, for there are a score or so topics which this series of sunshine pictures bring to mind. But now it only permits a word of hearty thanks for having shown that photography can effectively render sunshine in all its poetry and beauty.

Those of us whose work-a-day life confines us to a few miles of space, a score or so familiar faces, are doubly glad to see these pictures of Mr. Ashton. For they are wholesome reminders and help us to realize better the longer, wider links in the human chain.

The Factorial, Timing, or Watkins' Eikronometer Method of Development.

LET not the reader be alarmed by this group of names. For our purpose we may say that they all mean one and the same thing, and, let us hasten to add, a thing very easily understood. In 1893 Mr. Alfred Watkins noted the time which elapsed between pouring a developing solution on an exposed plate and the appearance of any sign of development of image, *i.e.*, "time of appearance." He also noted the total time the plate took to acquire a certain degree of contrast ("total time"). He then found that, using the same developing agent (pyro, metol, quinol, etc.), the ratio of the time of appearance to the total time was constant for a fixed degree of contrast range.

An example will make matters clear in a moment: A plate is exposed for one second on a certain subject and then developed with, let us say, ortol. The image appears in 30 seconds, and the required density contrasts we obtain at the end of ten times 30, or 300 seconds. (Note that the ratio or factor is 10 in the case of ortol.) A companion plate is exposed on the same subject for six seconds. Using the same developing formulæ, let us suppose the image appears in 25 seconds. If now we withdraw the plate in ten times 25 or 250 seconds, we shall find these two negatives yield practically identical prints although the time of printing may—probably will—be slightly different.

Further, we may modify our developing formula by adding more water, alkali, etc. This may perhaps defer the appearance of the image to, say, 50 or 60 seconds; but if we adhere to the same ratio, multiple or factor, *ten*, and carry on development for 500 or 600 seconds, as the case may be, then the resulting negatives, possibly differing in appearance to the eye, will nevertheless yield the same contrast range in the print.

If, however, we elect to use some other developer, such as metol or quinol, then instead of the ortol factor, 10, we must employ a factor of 30 with metol or 5 with quinol. This being done, the same range of density contrasts will result.

The following table is a quite possible state of affairs for different exposures on the same subject:

Plate.	Exposure.	Time of Appearance.	Developer and Factor.	Total Time.
1	3 secs.	12 secs.	Metol..... 30	360 secs.
2	5 ,,	45 ,,	Quinol ... 5	225 ,,
3	1 ,,	25 ,,	Ortol 10	250 ,,
4	10 ,,	10 ,,	Rodinal... 40	400 ,,

When all four negatives would yield the same light and shade contrast in the print. (Figs. 10 & 11.)

To simplify matters Mr. Watkins designed an ingenious form of clock with a slide calculator attached, which saves the user the trouble of multiplying the "time of appearance" by the "factor" in order to get the "total time." This form of clock is called an eikronomter. We now can see how this system is known by the four names at the head of this chapter. It is a *timing* system of development based upon the use of *factors* introduced by *Mr. Watkins* and simplified by means of his *eikronometer.*

Classification of Developers.—It is convenient to group developers into—(1) Those that bring out the lower tones soon after the appearance of the high-lights—for example, metol, rodinal and weak pyro. If the plate is withdrawn at an early stage, the result is a weak and flat negative with detail in the shadows.

(2) Those that do not bring out shadow detail, *i.e.*, lower tones, until the lighter tones have attained a moderate density—for example, quinol, edinol and strong pyro. If the plate be withdrawn at an early stage, it presents moderate contrast and little or no detail. Inexperience might hastily conclude that the latter plate was under-exposed and the former over-exposed, while if development had in each case been appropriately prolonged, equally satisfactory (amply exposed) negatives would have resulted.

(3) There are a considerable number (*e.g.*, ortol and moderate pyro) which are of an intermediate character.

The detail-holding-back property of bromide is more marked in class 2 than in class 1, hence where black and white results are desired one would naturally elect to use a member of class 2 with ample bromide.

As regards general efficiency for the same quantity of alkali, metol, ortol and pyro take first rank.

Blending Developers.—By mixing two or more developing agents we are able to get a blend which combines or averages their several qualities, hence the popularity of such mixtures as metol and quinol.

Alkali.—Varying the alkali alters the speed of working of the solution. Excess of alkali is liable to produce fog.

Water.—Diluting the developer is equivalent to reducing the alkali (and bromide) and slowing the action generally. But a dilute developer in a long time will yield the same result as the undiluted form does in a shorter time.

Time.—This is the chief means of control of contrast range. By increasing the factor or ratio of "total time" to "time of appearance," greater contrast is obtained by that developing agent. This must not be confounded by comparing the total time with two different agents, for a low-factor developer with short time of appearance would give a more contrast range in less time than a high-factor agent with long time of appearance, thus:—

	Factor.		Time of Appearance.		Total Time for Equal Contrast.
Developer X....	8	.....	15 secs.	.....	2 mins.
Developer Y....	12	.....	30 ,,	.....	6 ,,

Limits.—There is an obvious limit to the rule that the longer the development the greater the contrast, and this begins as soon as the highest light has attained the greatest density the plate can give. Prolonging development beyond this point means that the second, third, etc., next lower densities will tend to become equal to the maximum density possible. From this point contrasts are being obliterated at this end of the density range and contrasts reduced.

AN ARAB HOUSEHOLD.

Fog may set in before the desired density of the high-lights is attained. If development be carried on after fog sets in, no further gain of contrasts will be obtained; indeed, contrasts are much more likely to be reduced.

Temperature.—In general the warmer the developing solution the more energetic its action. If it is too warm, fog may result; if too cold, action may be impractically slow or cease altogether. The practical range is from 45°F. to 75°F., and either extreme should be avoided.

The effective speed of the plate is increased by the use of a high temperature. In such cases the gelatine should be first rendered insoluble by means of formalin, chrome alum, etc. The developing solution and dish containing it must be maintained at the desired temperature.

Halation.—Long-factor developers and those without bromide bring out halation sooner than short-factor ones, especially if bromide be used with the latter.

Comparing different Developers.—Let an exposed plate be cut in half, and each half be developed by a different developing agent free from bromide or other restrainer; then, if enough time be given to bring out the lowest tones in both cases and the plate be removed when the highest lights have attained equal density, the gradations of contrast will be the same in the two portions.

Control.—Increasing the bromide or decreasing the alkali tends to hold back the lower tones for a time, and so gives a measure of control. But these alterations must be made before the developer is poured on the plate. It is too late to make the alteration when once the image has put in its appearance. The chief value of such control is in cases of over-exposure, which is usually not detected until the image has appeared and the opportunity for effective control passed.

The Selection of a Developer is largely a matter of fancy. Roughly stated (the influence of bromide excepted) the same final results can be got with any developing agent. The chief thing is to arrange the proportion of water, alkali, etc., so that it does its work in a convenient length of time.

The Subject.—By modifying the factor we have a measure of control of density contrasts. Thus the contrast range may at discretion be adapted to the subject. It is obvious that we do not desire the same contrast range in all subjects. Mr. Watkins suggests that in cases where there is no white part or high-light such as sky (architecture, for example) to observe the time of appearance of the highest part of the image and take three-fifths of this as the time for multiplying by the factor. Because had there been a high-light it would probably have appeared in three-fifths of the observed time. In sky and cloud negatives, when a decidedly soft effect is generally wanted, it is suggested that the factor be reduced to two-thirds normal. Thus if the factor be 15 for ordinary conditions it would be reduced to 10 for sky and cloud, or to 9 for architectural and other similar subjects without sky or white portions.

Similarly in snow pictures or other very light objects the factor may be reduced to two-thirds or half normal.

Mr. Watkins gives the following factors, which are here arranged in their ascending order :—

5 Adurol.	10 Ortol.
5 Quinol.	12 Diogen.
6 Imogen sulphite.	18 Amidol (2 gr. per oz.)
7 Glycin.	20 Edinol.
9 Eikonogen.	30 Metol.
10 Kachin.	40 Rodinal.
10 Pyrocatechin.	60 Diamidophenol.

Pyro-soda or Pyro-potash Developer :—

Grains of pyro per oz.	Factor without bromide.	Grains bromide per oz.	Factor with bromide.
1	18	$\frac{1}{4}$	9
2	12	$\frac{1}{2}$	5
3	10	$\frac{3}{4}$	$4\frac{1}{2}$
4	8	1	4
5	$6\frac{1}{2}$	2	3

Generally we may observe that with the given quantities of bromide the factor is reduced to about one-half. Thus with a 4-grain per oz. pyro we have a factor 8, and by the addition of 1 grain of bromide the factor is reduced to 4. But the time of appearance will be different in the two cases.

Factors for Combination Developers, such, for instance, as metol and quinol, are approximately the average of the two constituents if in equal proportions. Thus equal parts of metol (30) and quinol (5) would have a factor of, say, 17 to 18. Similarly for other proportions, *e.g.*, three parts quinol and two parts metol, we have—

Quinol 5 + 5 + 5	=	15
Metol 30 + 30	=	60
Total five parts	...	75

Giving an average of $\frac{75}{5}$ = 15 as factor.

Calculating Pyro Factor from formulæ.—Take such a formula as—

A.		B.	
Pyro	1 oz.	Soda sulphite	2 oz.
Soda sulphite ...	4 oz.	Soda carbonate ...	2 oz.
Water to	20 oz.	Water to	20 oz.

Use one part A with eight parts B.

Thus 9 oz. of mixed developer would contain 1 oz. of A or one-twentieth of an ounce of pyro, *i.e.*, $\frac{437}{20}$ = roughly 22 gr. pyro. That is equivalent to $\frac{22}{9}$ = nearly 2½ gr. per oz. This without bromide corresponds to a factor somewhere between 12 and 10, say 11, according to the table given on page 10.

The Sextuple Factor is one of considerable convenience, because it means multiply the time of appearance by 6 and divide by 60; in other words, multiply by 10 and read as minutes for total time. Thus, if the time of appearance be 35 seconds with a factor 6 we see at a glance that the total time is 3·5 or 3½ minutes. Mr. Watkins gives the following pyro-soda formula with a factor 6:—

Stock Solution of Pyro.—Dissolve ¼ oz. potassium metabisulphite in 4 oz. tepid water. Pour into a 1 oz. bottle of pyro, and make up the total bulk of solution with water to 9 oz. 1 drm. (This is a 10 per cent. solution.)

A.		B.	
Stock pyro ...	1½ oz.	Soda carbonate ...	1 oz.
Dilute to	20 oz.	Soda sulphite	1 oz.
		Water to make ...	20 oz.
		Potassium bromide	20 gr.

For use, mix equal parts of A and B. If this is found to work too slowly increase the quantity of soda carbonate in B to 1½ oz.

Calculating the Factor with Bromide present.—Give two plates the same exposure on the same subject. Develop the first plate in a solution of the developing agent (with or without bromide) of which the factor is known. Suppose this to be 10, by way of example, and suppose the time of appearance to be 1 minute. Then the total time for this developer is 10 minutes. Next develop the second plate in the second developer, which only differs from the first in the proportion of bromide present, and note the time of appearance. Suppose this to be 2 minutes, then dividing the first total time (10) by the second time of appearance (2) we get the second developer factor 5. Thus :—

Factor of Developer A.	Time of Appearance.	Total Time.
10 ...	1 min. ...	10 min.
5 ...	2 min. ...	10 min.

This is based on the observation of Hurter and Driffield, who found that two developers differing only in the proportion of bromide present gave the same contrasts or steepness of gradation in equal times.

Some Special Applications of the Timing Method.

(1) Plates may be developed without a dark-room light. On a piece of plain glass, *e.g.*, an old ¼-plate negative glass, is pasted one or more strips of opaque lantern slide binding cut to half-width. In contact with this black and white negative is exposed a plate (of the same kind as those presently to be developed) at 40 inches from a standard candle for four times the inertia of the plate. (Exposure $= \frac{136}{\text{H \& D number}}$ seconds.) This pilot plate is cut up into strips of convenient size. A strip is developed in the selected developer (of which the factor is assumed to be known) to ascertain the time of appearance. This may be done in a dark-room wherein is a gas flame which can be turned up and down readily at frequent intervals to ascertain if the image has put in its first appearance. This ascertained and the factor known, we at once have the total time, so that the plate may be manipulated in total darkness from beginning to end of its development.

(2) A special case of the above method is that of such plates as are sensitive to the entire spectrum, or to the light which is used in the dark-room in question. By using sufficient developing solution to ensure the plate being quickly and thoroughly covered it may be developed without exposing it to any dark-room light of any kind.

Characters of Developers compared.—Mr. Watkins sums up the matter as follows :—

Effect on speed of plate,	Difference	slight, doubtful.
Searching out detail,	,,	none.
Ultimate density power,	,,	,,
Foggy propensity,	,,	,,
Effect on different gradations	,,	,,
Speed of working,	,,	great.
Appearance of image,	,,	,,

Hence it is a mistake to suppose that one developing agent has more detail searching power than another, when all are used free from bromide. If sufficient time be given they will all give the same amount. Similarly as regards density producing power. In the case of pyro used with little or no soda sulphite or other preservative we get in addition to the ordinary grey or black silver image an organic image of a greenish or yellowish colour. These two together have a total density greater than that produced under the usual conditions.

General Conclusions.—(1) The factor depends upon the developer and not on the formula (pyro and amidol are exceptions) see page 10. (2) Varying the quantity of water (dilution) or alkali, or restrainer (bromide), may alter the time of appearance, but does not alter the factor. (The quantity of bromide materially affects the pyro factor and probably other short factors, such as quinol, but has little, if any, effect on long factors, like metol.) (3) Temperature affects the time of appearance, but does not modify the factor.

Acknowledgment.—The compiler of the notes of this chapter gladly and gratefully places on record his indebtedness to Mr. Watkins, the inventor of this system, for his kindness in reading through these gleanings, and also for Mr. Watkins' readily-granted permission to make extracts from "The Watkins Manual" which deals with the subject in a most efficient and instructive manner.

Notes on the Timing System.

By HERMANN LEA.

AN objection often urged against the Watkins' system is that by its practice we obtain negatives of very varying density, thus increasing the difficulty of judging exposure when enlarging or printing in carbon or gum. But where exposures are timed by a reliable meter the resulting negatives will be remarkably uniform in density. In cases where exposure has been grossly inaccurate the best results will be obtained by slightly lengthening the development of over-exposed plates and subsequent reduction; or, in the case of under-exposures, stopping development rather short of the normal factorial time. This is, of course, supposing that the errors of exposure are not realized prior to flooding the plate.

The system is particularly useful where a number of plates of uniform exposure are to be developed, such as "snap-shots" taken at or near the same hour with a shutter working at the same speed. Then it will only be necessary to find the total time required in the case of one plate, and develop the remainder for that period. Thus a lot of trouble is saved, as also the risk of fogging through repeated examination.

Use fresh developer for every plate; it is false economy to repeatedly use the same solution. Pyro especially should never be used a second time. One grain of developing salt is only capable of reducing a certain amount of silver in the film, and if for any special reason the solution is used very weak (say, less than one grain to the ounce), the whole bulk should be increased until there are at least two grains present for a quarter-plate, four grains for a half-plate, etc. The exception to this rule is in cases where a thin negative is aimed at. Metol and similar agents may perhaps be used for two successive plates, but it must be remembered that, in addition to a reduction in power, the solution is further modified by the bromine set free

whilst developing the first plate. Moreover, the factor must be altered to ensure the second plate having the same steepness of gradation as the first.

The factor does not alter for different brands of plates or films, except in a few rare cases, such as the double-emulsion cristoid film, which requires a considerably higher factor than does a single film. Some isochromatic plates appear to require a slightly lower factor than the normal, but a test exposure will at once decide the necessary variation.

Ferrous Oxalate Factorial Development.

By FRED W. EDWARDS.

THE factorial method of development is applicable to ferrous oxalate, but owing to this developer's peculiar composition, the factors influencing time of development, contrast and density, are a modification of the factors for all other developers. In the first place the ferrous oxalate developer, does not permit the adjustments and modifications of formulæ as does other developers, the excellent Editorial recapitulation of "hints and formulæ," containing practically every formula the developer will yield. The factor of temperature, however, greatly influences development, as the solutions, used to saturation, become perceptibly weaker with precipitation at lower temperatures, besides the acceleration and restraint a high and low temperature always produces. A standard temperature of 60°F. (15·5°C) should always be maintained. In my own practice, using the normal formulæ at 15·5°C., the time of appearance is about 30 secs. and suitable density and contrast are obtained in 5 min. (30″ × 10=5 min). If the image does not appear in 30 secs. a stronger solution, or acceleration with hypo should be resorted to, and if the time of appearance is much less than this, a weaker solution with bromide should be used. If the "hypo" formulæ be always used in preference to the normal formulæ, the acceleration due to its use may be made a constant factor by a reduction of exposure to about one-third.

Control in Development.

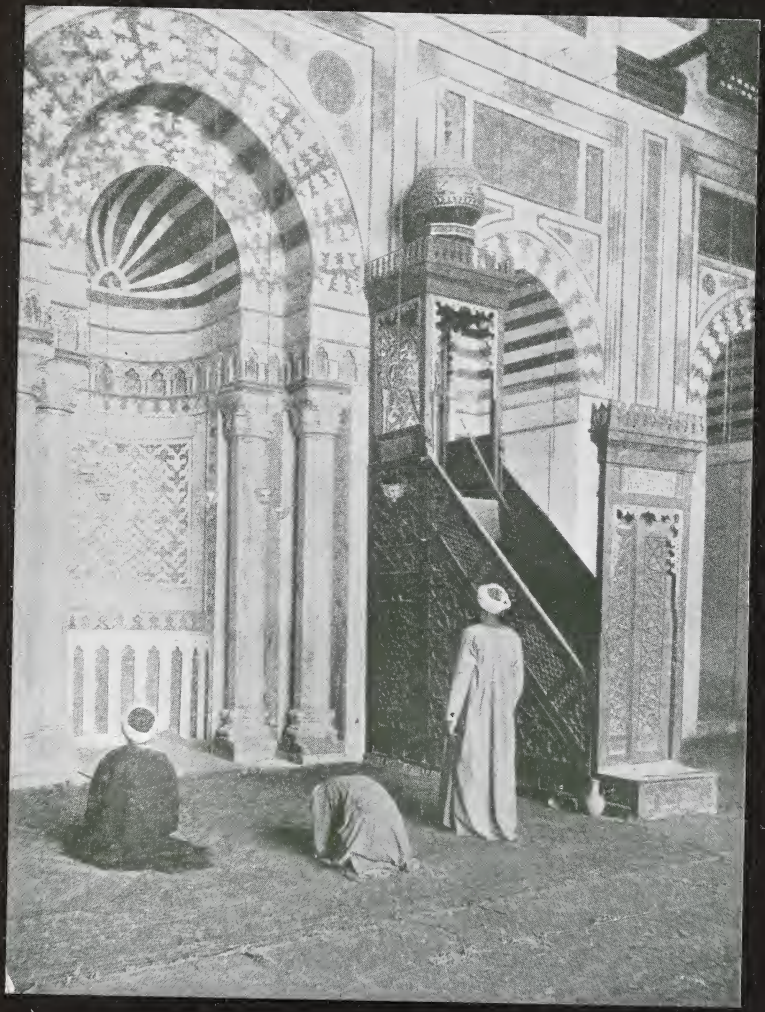
By HENRY W. BENNETT, F.R.P.S.

HEN considering the subject of the development of negatives, it is necessary in the first place to determine the composition of a normal developing solution which may be taken as a standard from which departures may be made to suit varying conditions and requirements, and, after ascertaining the effect of developing an exposed plate to different degrees in this, to analyse the action of solutions containing varying proportions of the constituents, and compare their results with those given by the normal solution.

Exposure. It is also desirable to confine the examination first to plates that have been correctly exposed. Afterwards extending it, if results are sufficiently promising, to those that have received too long or too short an exposure.

Subject. Although the results of development may be more accurately studied by means of plates exposed in graded strips, each strip having a definite ratio to the preceding, yet exposures made on a still-life subject will appeal far more readily to the majority of photographic workers, by showing the results in the form to which they are most accustomed.

Its range. It is essential that such a subject in order to be useful for comparative tests should possess a good range of contrast, and a full scale of tones. There should be details capable of effective representation both in the lightest and darkest parts, so that comparisons can be made in the manner in which these details are rendered in relation to the total contrast in the final print. If a subject very deficient in contrast is used the variations in the result are, in most cases, too small to enable a definite judgment to be formed.



Developers. In examining alkaline development, it will be sufficient to select one developing agent and to consider that as a type. Although there are differences in the course of development with many reagents and in the character of their results, yet the general principles are the same. The experience gained by a systematic study of one will ensure correct judgments to be formed in regard to others, the nature of any slight differences that may arise being easily detected and understood.

Pyro. In this article, pyrogallol, or as it is more frequently called, 'pyro,' has been selected as the developing agent. It is not only very extensively used, but in addition, there appears to be no developer superior to pyro in any way, whether considered in its capacity for searching out faint detail that has received the minimum exposure, or in giving density, or in freedom from fogging tendency. There are many reagents that are very inferior to pyro in those qualities that render a developer most suitable for general work.

Alkali. Sodium carbonate has been taken as the alkali or accelerator for study in conjunction with pyro, though the substitution of others will make no difference whatever in the methods of modifying the solutions for variations in work, nor in the ordinary course of development. Ammonia and carbonate of potassium are the other accelerators most frequently used, the principal difference between them and sodium carbonate being in strength, and, consequently, in the quantity required.

Ammonia. The contention that ammonia is unreliable for accurate work in development owing to loss of strength by evaporation may be dismissed. Careful experiments fail to indicate any material difference in this respect between ammonia and soda when used in conjunction with pyro. The only real objection that can be urged against ammonia is that with some plates, especially the very rapid kinds, surface fog or staining is produced if development is prolonged, and in a few cases green or dichroic fog results.

Equivalent quantities. In regard to strength, eight grains of good crystal sodium carbonate, or five grains of potassium carbonate will satisfactorily replace one minim of strong ammonia in practical development.

Sulphite. A sulphite, preferably sulphite of soda, is used in conjunction with pyro to prevent the rapid discoloration of the developer when in use, and the consequent staining of the film. The proportion required for this purpose will vary from four to eight times the amount of pyro in the developer under normal conditions, according to the quantity of alkali used and degree of development. For a dilute solution the proportion of sulphite must be increased to ensure the same immunity from stain. When ammonia is used the quantity of sulphite may be reduced to one-half of that given.

There is a second purpose served by the use of a sulphite, namely, the preservation of a stock solution of pyro in good condition. A solution of pyro and sulphite must be distinctly acid in order to possess good keeping qualities; a neutral, alkaline or plain aqueous solution will rapidly oxidize and become useless. In my own experience there is no substance equal to metabisulphite of potassium as a preservative of pyro in solution, and it contains sufficient free acid to require no further addition. A solution containing one ounce of pyro and half an ounce of metabisulphite of potassium in 9¼ ounces of water will keep indefinitely if carefully mixed; the metabisulphite in distilled water first, the pyro added, and the solution filtered. Ten minims will contain one grain of pyro (approximately).

Bromide. The addition of a small quantity of an alkaline bromide, preferably bromide of potassium, is practically essential, though there is a tendency with many workers at the present time to omit it from the developer altogether, but it is difficult to find any sound reason for this course.

Fog. If a small quantity is used—from a quarter to half a grain to each ounce of mixed developer—the only result is to

preserve the plate from fog, or the formation of a deposit on those parts that have received no exposure to light under the prolonged action of the developer.

It cannot be too strongly asserted that fogging of the unexposed portions of a plate is in every respect detrimental. There is no result that can be given by a fogged plate that could not be produced equally well or better on one free from fog, and the fog detracts very materially from the contrast and brilliancy in the resulting prints.

It is surprising how large a proportion of negatives suffer from being fogged, and the most frequent cause is the use of an energetic developer without bromide. And there is absolutely nothing to be gained by the omission. Without bromide fogging is inevitable.

Effect of Bromide. When used in larger quantities bromide has a very strong restraining influence on the lower tones of a negative, those parts that have received least exposure to light, and assists in securing greater contrast in the negative by allowing the lighter tones to gain strength relatively more rapidly. This restraining power is, in reality, exercised throughout the whole scale of tones, the plate develops much more slowly; but its influence is most marked on those parts that have received least exposure.

Comparing Results. In comparing different developing agents, or various modifications in the proportions of any one developer, the real significance or value of the modification or difference in character is frequently not sufficiently recognised. In the power of searching out faint detail in under-exposed plates, for example, a pyro-soda developer containing two grains of pyro, sixteen of soda, and a quarter of a grain of bromide in each ounce, and the same solution diluted to eight times its volume by the addition of water, would each produce the same amount of shadow detail if the action were sufficiently prolonged in each case.

But it is quite incorrect to assume, as is frequently done, that there is, in consequence, no advantage in

diluting the solution in special cases, or that the strong and weak solutions produce identical results. The faint shadow detail cannot be considered alone, but only in its relation to the other parts of the scale. Where one solution might develop certain faint details to a particular strength combined with only a moderate degree of density in the highest light, the other, by the time that the same faint details had acquired the same strength would have rendered the lighter tones so opaque that the negative would be absolutely useless for any printing process. At no stage in development would the two plates be identical throughout the scale.

The same principle applies equally to the power of producing density. It is sometimes stated that all developers will produce equal density if their action is sufficiently prolonged, but in this, as in the preceding case, only part of the question is considered, and the remainder ignored. The crucial point in the production of a negative is not merely the density of the high-lights but their relation to the weaker tones. It is in this that differently constituted developers vary so much.

In comparing such developers for producing density, it will be found that when equal strength in the high-lights is reached, one may have given relatively weak shadow detail with the extreme shadows very clear, while the other may have produced more details in the shadows, rendered all the darker details much denser, and strongly degraded the shadows as well.

In considering the result of varying the proportions of a developer, the complete scale of tones must be judged as a whole, not in separate parts; the relative strength of the two ends of the scale is an essential consideration in the problem.

Normal Developer. Before examining the effects of modifying the composition of the developer, however, it is essential to fix some solution that may be termed normal and ascertain what is the course of development in such a solution, what is the character of the image in its initial stages, and when development is carried further. This will determine whether

One of the Faithful.

the gradation retains the same character throughout development, or whether the relation between light and dark tones varies as this operation proceeds.

Two Questions. Practically the question resolves itself into two parts, viz., the effect of modification of the solution, and the effect of time on the normal and modified solutions.

Briefly, it may be stated that the results described, and the conclusions founded on them, have been definitely formulated from specially-made test negatives exposed in strips with a sufficient range of exposures on each plate to cover the range of light intensities found in all ordinary subjects. After development the silver deposit on each strip of the plate was measured, and the results compared.

This measurement of the actual work of development confirmed the opinions formed from working in a systematic manner on very varied subjects in ordinary negative making.

Normal or Standard Developer. A solution that is termed normal simply in the sense that it forms a basis for comparison and modifications is one that will develop satisfactorily a plate correctly exposed on a landscape of moderate contrast, producing full printing strength and contrast and leaving the unexposed portions free from fog or deposit. Such a solution consists of—

Pyro	2 grains.
Potassium bromide	½ grain.
Sodium carbonate	16 grains.
Sodium sulphite	16 ,,
Water	1 ounce.

Temperature. The temperature of the developing solution exercises a considerable influence on the course of development, but this is principally confined to hastening or retarding the operation; a warm solution always acting more rapidly than a slow one. In my experimental work a temperature of 60 to 65 degrees has always been maintained, and this is assumed in all the following descriptive notes on the course of development.

An Experiment. If two plates that have been exposed on a landscape subject of strong contrasts, one plate being correctly exposed and the other having been given four times as long, are placed together in the solution given, the sky or part that has received the most light action will, with each plate, commence to darken in from thirty to forty-five seconds, this time varying with the plate. The two images will appear practically at the same time, as well as other parts that may have received almost as much light action as the sky.

Its Lessons. From this, two conclusions are formed, both of which are confirmed by experimental tests. The first is, that an exposure to light sufficient to produce the density necessary for a high-light with normal development, will show a visible image in much less time than an exposure that merely yields shadow detail; and the second, that exposure to light several times longer than this will not produce an image in appreciably less time.

Examining the correctly-exposed plate, it will be seen that other parts of the picture follow the sky in darkening, the more exposed first and the shadow details later, until about two minutes after pouring on the developer, when almost the whole of the image should be visible.

At this stage, the shadow details will be very weak—mere traces of an image—and the whole of the gradations throughout, including those in the extreme lights, will be well marked. As development proceeds, the shadow details gain strength in a more rapid degree than the high-lights, and concurrently with this accession of strength in the shadows the gradations in the lighter tones become less pronounced.

Very short development in the normal solution given, will only bring out the better-exposed portions of the image.

With longer development, the shadow details are all visible, but relatively very weak, the high-lights having acquired moderate strength.

With more prolonged development the shadow details gain strength considerably, and relatively, much more than the lighter tones.

This diagram, drawn to scale from an actual experiment, illustrates these points and allows the conclusions to be summarised.

A. Short Development.
B. Normal ,,
C. Prolonged ,,

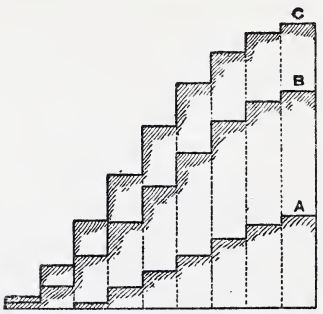


Fig. 1.

Short development produces a scale of gradation quite different from that given by longer, the gradations in the lighter tones being more pronounced with shorter development, and the gradations in the shadows stronger when development is prolonged.

Over-Exposure. Turning now for a moment to the over-exposed plate, although its appearance in development is quite different from that of the correctly exposed, yet the differences are simply those that correspond to the changes in the plates just considered.

The different tones forming the picture follow each other much more rapidly in darkening, a large proportion of the plate having received light action closely approaching the high-lights of the correctly exposed. While no portion has received the small amount of light that has formed the detail in the extreme shadows of the other.

As the invariable result of over-exposure is to flatten the contrasts of the picture, especially in the lighter tones, the most obvious course is to adopt that method that renders the lighter gradations best, as no part of the plate has received the minimum exposure that forms shadow detail in one correctly exposed.

From the examination of the course of development of the correctly exposed plate, it will be seen that if the development of this over-exposed plate is stopped at an early stage, as soon as the weaker tones are sufficiently strong in their relation to the high-lights,—though both may be far from strong enough for printing,—the gradation in those parts

that suffer most from over-exposure will be at its best; and by fixing, washing and subsequently intensifying the plate, a far better result can be secured than by continuing the development in the original solution. The result of modifying the solution during development must be considered later.

The effect of uniformity of development for correctly over and under-exposed plates in opposition to the suggestion just made in regard to over-exposure, requires but brief consideration. It is most easily examined by assuming rather greater differences than would occur in the ordinary practice of a careful worker. For that reason three exposures on a subject of moderate contrast are assumed, one being correct, one being only one-fourth, and one four times the correct amount.

In uniform development, the degree selected would naturally be that most suited for a correctly exposed plate, since every worker usually aims at correct exposure.

It has been shown in a preceding paragraph that the degree of development suitable for correct exposure renders gradation badly in over-exposed plates. But there is also another serious objection. By the strengthening of the image in the darker tones by prolonged development, the extreme shadows that should remain comparatively clear become badly veiled, as they have received an exposure equal to strongly marked details in a correctly exposed plate.

By this fogged or degraded shadow the contrast in the print is considerably reduced, and the time of printing enormously lengthened.

Under-Exposure. Also as regards under-exposed plates, the objections to uniformity of development with those correctly exposed, though opposite in character, are equally strong. With a correctly exposed plate development is stopped while the extreme shadows are practically clear and the existing detail sufficiently strong in relation to the lighter tones.

In the under-exposed negative, this same degree of development will leave an appreciable proportion free from detail or image of any kind, while the

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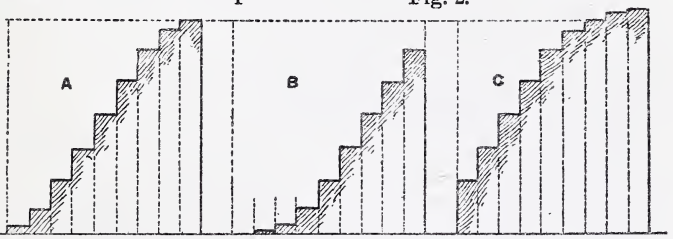
lighter tones will be far less strong than desirable. Longer development will, to some extent, compensate for deficiency in exposure.

Expressed briefly, the degree of development best suited for correct exposure is too short for under-exposure and too long for over-exposure.

A diagram, drawn to scale from test negatives will illustrate this point.

Fig. 2.



A. Correct Exposure. B. Under-exposure. C. Over-exposure.

For purposes of illustration, a greater degree of error has been assumed than will probably occur in the practice of any careful worker, a very large proportion of whose plates will be so well exposed that the comparatively small errors can be fully rectified by development in the solution considered best for correct exposure, and the operation slightly lengthened or shortened to produce the effect desired, this effect being judged by the appearance of the plate.

In this example a certain degree of development was assumed as desirable for a certain subject correctly exposed. But it is not to be assumed from this that uniformity of development is in any way desirable for all correctly exposed plates.

Character of Subject. Subjects differ enormously in their character and degree of contrast. The development most suitable for a landscape deficient in contrast would be far from desirable for one in which the contrasts were ten or twenty times greater—a forest scene, for example.

For this change in character compensation can be made to a moderate extent by simply varying the degree of development in a uniform solution; by varying the composition of the solution much greater compensation may be secured.

The two methods must be considered independently.

The effect of the time of development on the character and strength of a negative has been shown in a previous paragraph. It is an easy transition from this to show how this effect at different stages may be utilized to suit variations in the character and contrast of the subject.

In this and the following examples correct exposure is assumed; an exposure that will give sufficient strength of shadow detail without unduly veiling the extreme shadows.

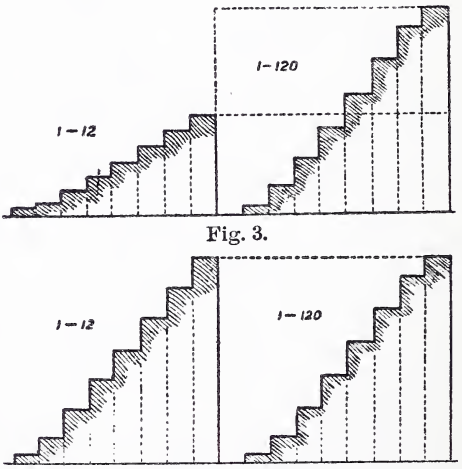


Fig. 3.

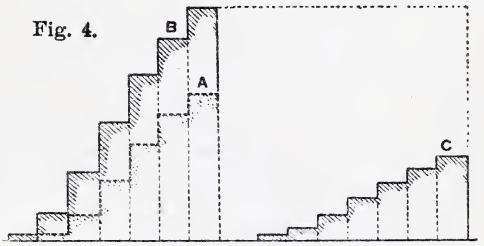
This diagram, drawn to scale from test negatives, illustrates in the first figure uniform development in the case of negatives of two subjects—the upper possessing a contrast of 1—12, the other 1—120—both well within the limits of ordinary subjects. The lower figure shows the effect of varying the time of development only, the time for the weaker subject being $2\frac{1}{4}$ times that of the stronger. By this variation the strength of shadow detail and total contrast are identical in the negatives of the two subjects:—

Diluting the Developer. The most simple modification to examine is that of dilution, or the effect of the degree of concentration on the contrast and character of the negative. The most striking effect of simply diluting a developer with water is the difference in the contrast in the plate and the changed relation between the strength of the shadow details and that of the high-lights. Referring to the diagram

of the course of development, p. 23, Fig. 1, it will be seen that when the sky and lighter tones are weak the shadow details have not even appeared; by the time that the latter have gained sufficient strength the former have acquired considerable density; and though in normal subjects this is desirable, in those of excessive contrast the high-lights may be abnormally dense before the shadow details are sufficiently developed, and a harsh black and white print result.

By diluting the developer the shadow details will acquire strength long before the high-lights, and a degree of softness secured in cases of extreme contrast that the normal developer will never give. At no stage in the course of development with the normal solution will the result in any way approach that given by the same solution diluted.

Fig. 4.



This diagram shows—A, short development in the normal solution, moderate density in high-lights and no shadow detail; B, longer development, strong shadow detail and dense high-lights; C, long development in solution diluted by using eight ounces of water instead of one to the same quantity of pyro, bromide and alkali with the result that with shadow detail equal to long development in the normal solution, the density of the high-lights is only equal to that given by the short development in the normal strength of developer.

This dilution should always be adopted in all cases where normal development would give harsh results; excessive contrast in the subject or under-exposure. By this simple method a degree of softness is secured unattainable by any other means. Development in a dilute solution is proportionately slower.

Varying the Alkali. The effect of varying the proportion of sodium carbonate is very marked. By decreasing the amount, leaving the quantity of the pyro and bromide unchanged, development is rendered much slower, and the contrast between the high-lights and shadow details increased. By increasing the amount, the pyro and bromide remaining unchanged, the opposite effect is produced; the shadow details are much stronger relative to the high-lights, and development takes place more rapidly. With some plates the quantity of sodium carbonate may be increased to twice that given on page 21, but with many this increased quantity will produce fog unless development is comparatively short.

Quantity of Alkali. In a diluted developer, however, a larger proportion of sodium carbonate may be used than in one of normal strength without producing fog; and in this dilute solution, and also in the normal developer with the extra soda, the value of the bromide in securing freedom from fog is very great.

Bromide. The small proportion of bromide given does not in any way prevent the full shadow detail from being secured in cases of under-exposure, but rather the reverse. By preventing fogging, it allows development to be much more prolonged, and the value of the developed detail is relatively greater.

If the diluted solutions fail to give sufficient density by the time that full shadow details have been secured, the plate may be finished in the normal solution.

A dilute solution with the increased quantity of soda should always be used for under-exposure and extreme contrasts.

A diagram will illustrate its value.

B. Normal Developer.

B. Dilute 1-8 and extra alkali.

C. Normal developer with extra Bromide.

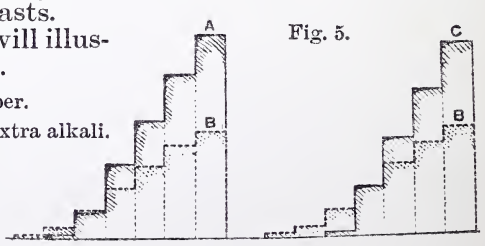


Fig. 5.

The effect of increasing the quantity of bromide is to increase the contrast in the negative beyond that which the normal solution would give. It has been stated previously that development is rendered much slower, but in addition, the high-lights gain strength relatively more quickly than the shadow details, and by the time that these are sufficiently developed, the high-lights will be much stronger than when developed in a normal solution. The gradation will also be more similar to the character of that given by short development in a normal solution.

The amount may be increased to two grains to each ounce of solution, and for known cases of over-exposure or subjects excessively deficient in contrast or plates exposed in a hazy light, this plan should always be adopted.

These variations in the composition of the developer have, so far, been considered solely in regard to those plates that have been developed throughout in the different solutions.

The effect of modifying solutions during the progress of development can be described briefly, as the principle is the same, but the degree of modification must be different to secure the same result.

Errors Detected on Development.

In many cases of error of judgment in exposure or suitable developer, it is not recognised that the error is greater than can be compensated by merely increasing or decreasing the duration of development until the appearance of the plate tells its story in unmistakable terms.

It must be self-evident that when the plate is partially developed, and the film contains developer that is still working, that any modification must be much more drastic in character to effect an alteration during the remainder of the operation after displacing the solution in the film, than would have been sufficient to produce the altered character if used from the commencement of the operation.

If harshness or under-exposure is evident, transfer the plate to a dish of plain water, and an effect similar to that given by dilution may be secured. The plate may be allowed to remain in the water

without changing for five to ten minutes, and then finished in a dilute solution.

The developer remaining in the film when put in the plain water will continue to act in the shadows much more than in those parts most developed, as in the latter the work done has exhausted its power.

If a plate in a normal developer shows the opposite character to the preceding, it should be transferred to a ten per cent. solution of potassium bromide, allowed to rest for four or five minutes, and development finished in a solution containing more bromide and less soda than the normal.

By this means it is easy to compensate for differences as fully as by working with the modified solutions throughout.

In each case, the plate should not be washed between taking from the normal solution and putting into the plain water or bromide solution. The change must be made as quickly as possible, if it is to be effective.

Summary. The effect of the various modifications may be very briefly summarised.

Variation in time of development will exercise a certain amount of control over the character of the negative, and also compensate for moderate differences in the character and contrast of the subjects. It will also compensate for slight errors in exposure.

Far greater control can be exercised by modifying the developer and varying the extent of its action in addition.

If it is desired to exercise control by modifying the solution after development has commenced, the alterations in the composition of the developer must be much greater than if made at the commencement of the operation.

Errors of Exposure and Development, Preservatives, etc.

By F. C. LAMBERT.

FREQUENTLY the tyro confuses the effects of faulty exposure and development. The six illustrations, 12-17, accompanying this note may help to make matters a little clearer in the beginner's mind.

Figs. 12 and 13 are both considerably under-exposed, as we may see by absence of shadow detail. In 12 we have practically two shades of grey corresponding to high-lights and shadow portions. Prolonged development shows a little detail in the half shades, but the darker portions are without gradation (Fig. 13).

Fig. 14 having had normal exposure shows considerably longer range of detail even with brief development. Too prolonged development gives a greater degree of contrast than the print can record, although the negative possesses ample shadow detail and gradation. Inexperience might lead one to infer from Fig. 15 that the exposure had been insufficient, whereas the error is excessive density contrasts due to prolonged development and not absence of detail or gradation.

In Figs. 16 and 17 we see abundant detail with lack of sufficient density contrast. Prolonging development adds density to all parts of the negative without giving very much increase of contrast. Such a negative takes a long time to print.

Briefly, then under-exposure means absence of shadow detail in the negative. Over-exposure means abundant detail with flatness or lack of contrast; prolonging development increase of density and increase of contrast as well. This, of course, ceases as soon as all the developable silver has been reduced, when further development reduces contrasts at the light end of the scale.

Under-exposure usually also means an increase of the normal time of appearance of the image, while excessive exposure usually shows the image in something less than the normal time of appearance.

Preservatives.—If we add to a dram or so of pure water as much clean white pyro as we can take up with the blade of a penknife, we find it quickly dissolves. In a few minutes the solution begins to turn yellow, then brown, then black. If tap water be used the change is somewhat quicker. The cause is oxidation of the pyro by absorption from the air, and air dissolved in the water. This coloured pyro solution will rapidly impart a stain to gelatine.

What happens with pyro happens somewhat more slowly with the other organic developers, metol, amidol, etc. To prevent these substances from absorbing oxygen we must add to the water some substance still more greedy of oxygen, so that it will preserve or protect the developing agent from oxidation. Hence the name of preservatives in this connection.

Two practical precautions will suggest themselves to us at the outset. First to use water as free as possible from dissolved oxygen or other impurities. The dissolved oxygen may be expelled by boiling the water. Pure water, or failing that, filtered rain water, or failing that, well boiled tap water, should be used for developing solutions. Second, all reasonable precaution should be taken against exposing the stock solutions to the air—*e.g.*, opening the stock bottle more frequently than is necessary and using small sized stock bottles so that they may be less frequently opened and their contents exposed to less air surface.

One of the most convenient preservers or oxygen absorbers is sulphur di-oxide (SO_2) in some form or other.

If sulphur be burnt in air, we find that one atom combines with two of oxygen, giving us the familiar evil smelling gas, sulphur di-oxide ($S+O_2=SO_2$). This gas dissolved in water gives us sulphurous acid ($SO_2+H_2O=H_2SO_3$). This was at one time a favourite preservative, but its strength being a variable (and so doubtful) quantity caused it to give way to the more convenient salts of this acid, *viz.*, acid sodium sulphite, or soda bi-sulphite ($HNaSO_3$) and neutral sodium sulphite (Na_2SO_3), the latter being preferable. The next claimants for favour

Fig. 9. SWANS. W. H. Mack.

were the metabisulphites of potassium and sodium. The former being the more generally obtainable has become the favourite. Its formula is $K_2S_2O_5$ or $K_2O\,SO_2\,SO_2$. Comparing this with the ordinary "sulphite" which also crystallises with seven molecules of water ($Na_2SO_3 7H_2O$) we can see at a glance that the metabisulphite contains more SO_2 than the sulphite does. In fact, in half an ounce of the metabisulphite we get more SO_2 or actual preservative than we do in an ounce of the ordinary sulphite. Again the metabisulphite keeps better than sulphite. This latter absorbs oxygen from the air and the glassy crystals of sulphite become coated with a white powder of soda sulphate.

Acetone sulphite is another very convenient form of SO_2 preservative. It is a white granular powder soluble in water up to 50 per cent. Ten parts of acetone sulphite are equivalent to seven parts soda sulphite. Its ready solubility renders it of value in preparing concentrated stock solutions.

Nitric acid and citric acid are sometimes used as preservatives for pyro solutions.

Half a dozen Dont's.

Don't forget to use water-proof ink for writing the formula of contents of each bottle, and varnish the label as an extra precaution.

Don't use the same shape or size of bottle for accelerator and restrainer or awkward mistakes may arise.

Don't forget that quinol, pyrocatechin, adurol, glycin, diogen are slow-working developers, and do not bring out the shadows until the high-lights have had a good start.

Don't forget that metol, rodinal, eikonogen, amidol, are quick-acting developers, bringing out the shadows quickly after the high-lights.

Don't forget that the slow-acting developers are not so sensitive to bromide or low temperatures as are the quick-acting class.

Don't make the common mistake of thinking that you can learn all the good and bad points of a developer by one or two trials.

Practical Notes on Some Modern Developers.

By THE EDITOR.

PROBABLY the reason why "good old pyro" still holds the field against all comers with many of the older hands is due—partly to a reluctance to risk a change for what the worker thinks might be the worse, partly to mental idleness and unwillingness to study the new agents, partly to a notion that they are more costly to work. That some of the new agents possess specially valuable qualities will only be denied by those who have a prejudice against acquiring sufficient knowledge of them. The risk of changing is quite imaginary. There is nothing that pyro can give that cannot be obtained quite as easily by some of the other agents. The "cost" objection, in many cases, is not supported by experience.

As a matter of fact while admitting the good qualities of pyro, for which the present writer has a sneaking fondness, due to early experiences, it is only fair to say that pyro is not the best or easiest for the beginner to take up. For its good qualities require no little study and experience to master and appreciate.

A common mistake is that of thinking that a little experience with one developer is a sure guide in the case of all others. For instance, a worker who begins with quinol finds that about a minute elapses before the image puts in an appearance after the developer is poured on the exposed plate, and has learned that it takes, say, five minutes to get sufficient printing density. He then tries metol and finds that the image comes out in about ten or twelve seconds. From this he (quite wrongly) concludes that the plate is over-exposed and stops development perhaps at the end of a minute or so. The result is a thin image full of detail, but poor in density range. From this he concludes (quite wrongly again) that metol will not give density, requires a very short exposure, etc.,etc., and finally condemns it as "no good at all for negatives."

"PYRO."

Pyrogallol, pyrogallic acid, or more familiarly "pyro," is a fine, light white powder readily soluble in water. Exposed to the air dry pyro slowly darkens. In plain water it turns yellow, brown and black in a short time. Hence the need of preservatives. (See page 32.)

Pyraxe is an exceedingly convenient form of pyro in small crystals, occupying about one-tenth the room of ordinary pyro, and keeping longer in the dry (crystal) state.

It would confuse rather than assist the worker were we to reproduce one-hundredth part of the formulæ published. It seems preferable to give one or two which are quite reliable and typical, and to draw the student's attention to proportions rather than quantities.

It is convenient to dissolve the entire contents of a one-ounce bottle of pyro in $9\frac{1}{4}$ ozs. of solvent and regard this as a practical 10 per cent. pyro stock solution (*i.e.*, 10 minims containing 1 grain pyro).

Quantities of Preservative for 1 oz. pyro :—

(1) Soda sulphite crystals, 4 ozs.; plus enough citric or sulphuric acid to give a decided acid re-action.
(2) Sulphurous acid, 3-4 ozs.;
(3) Pure nitric acid, 20 to 30 minims;
(4) Potass. metabisulphite (varies greatly according to different authorities) $\frac{1}{2}$ oz. to 1 oz.;
(5) Acetone sulphite, $\frac{1}{2}$ oz. to 1 oz.

The preservative should be dissolved in the water before adding to the pyro.

Proportions of Alkali to 1 grain pyro: Soda carbonate crystal, 6 to 12 grs.; liquid ammonia (fort. ·880), 1 to 4 mins.; potassium carbonate, 3 to 9 grs.; potass. bromide, $\frac{1}{10}$ to 6 grs.; acetone, 5 to 15 parts. (For normal proportions consult article in this number by Mr. Bennett.)

By keeping the pyro, bromide and accelerator in three separate solutions, one may easily ring the changes by varying constituents and proportions as circumstances may require at the moment.

The following are convenient proportions :—

A. Potass. metabisulphite, ½ oz.; water, 9 ozs.; pyro, 1 oz.
B. Liquid ammonia, 1 oz.; water, 3 ozs.
C. Potass. bromide, 1 oz.; water, 9 ozs.
D. Soda sulphite, 1 oz.; soda carbonate, 1 oz.; water, 6 ozs.
E. Soda sulphite, 1 oz.; potass. carbonate, ¾ oz.; water, 6 ozs.
F. Acetone.

Normal quantities for 4 ozs. mixed developer:—

Pyro-Ammonia—1 drm. A, 1 drm. B, and ¼, ½ or 1 drm. C, as the exposure has been normal, full or excessive, and dilute with water to total 4 ozs.

Pyro-Soda—1 drm. A, 1 oz. D. No bromide unless exposure has been excessive (then use 10 to 100 mins.) and add water to make 4 ozs.

Pyro-Potash—Replace 1 oz. D by 1 oz. E in the pyro-soda formula.

Pyro-Acetone—1 drm. A, 1 drm. F. No bromide unless exposure has been excessive (then use 10 to 100 mins.) and dilute to total bulk, 4 ozs.

Four ozs. developer suffice for a whole-plate.

The above quantities are easy to remember, being *one* dram or *one* ounce for a ¼-plate, *i.e.*, 4 oz. developer. Bromide only varying according to suspected errors of exposure. Thus for 1 oz. of developer for a *quarter*-plate we use ¼ dram or ¼ oz., as the case may be.

METOL.

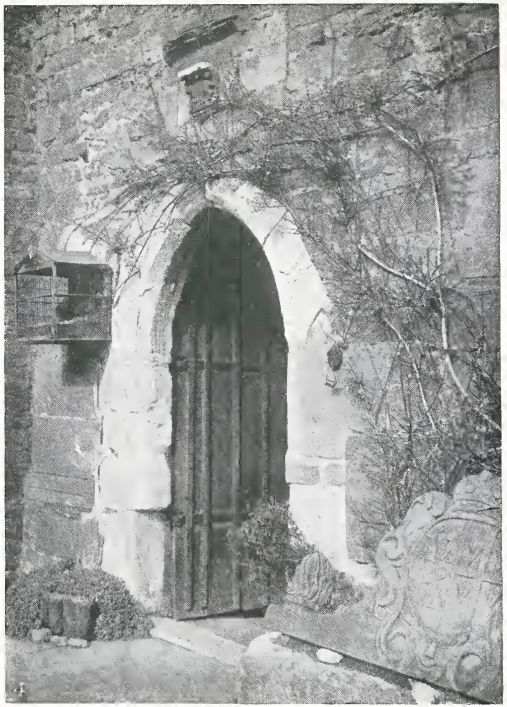
Metol is mono-methyl-par-amido phenol sulphate. This is a light-coloured powder moderately soluble in water, *i.e.*, 100 parts water will dissolve about 2½ parts metol. Metol exposed to the air turns grey, and this yields a coloured solution. In conjunction with the usual preservatives it remains a colourless solution for several weeks. Time brings discoloration and slows its action, but a coloured solution need not be discarded until actual trial shows it is useless.

The following single solution formulæ are both useful for special purposes.

For portraiture, soft effects and brief exposures.

(1) Metol, 40 grs.; soda sulphite, ½ oz.; potass. carbonate, ½ oz.; potass. bromide, 2 grs.; water, 10 ozs.

Fig. 10. HALF A SECOND EXPOSURE.



FOUR SECONDS EXPOSURE. Fig. 11.

Each plate was developed (with pyro) for a "total time" of thirteen times the "time of appearance." See page 6.

(Negatives by Mr. Watkins).

For bright effects, with generous exposures.

(2) Metol, 30 grs. ; soda sulphite, ½ oz. ; soda carbonate, ½ oz. ; potass. bromide, 5 grs.

For general use by workers tolerably sure of approximately correct exposure.

(3) In 19 ozs. of water dissolve 1 oz. soda carbonate and 1 oz. soda sulphite. Allow any sediment to settle. Decant off the clear part. In this dissolve 60 grs. metol and make up to 20 ozs. with water. No bromide is used or required.

For occasional workers a two solution formula is more convenient as the Metol keeps longer in working order.

A.	Water	10 ozs.	10 ozs.	10 ozs.
	Soda sulphite	½ ,,	1 ,,	...
	Potass. metabisulphite	,,	,,	60 grs.
	Metol	40 grs.	50 grs.	60 ,,
B.	Water	10 ozs.	10 ozs.	10 ozs.
	Soda sulphite	½ ,,	¼ ,,	...
	Soda carbonate	1 ,,	1 ,,	...
	Potass. carbonate	...	...	1 oz.
	Potass. bromide	...	10 grs.	5 grs.

In all cases A and B are used in equal quantities

There seems to be no foundation whatever for the prevalent notion that the metol should be dissolved before the preservation. The rational system is to dissolve the preservative first.

Metol is chiefly remarkable for bringing out the shadow details of the image very soon after, sometimes apparently at the same time as the high-lights. This characteristic of metol is one of especial value where detail without great contrast is required, as in negatives for enlarging, or where the exposure has been verging on the minimum. The beginner is advised to expose a plate as correctly as possible, and then cut it up into four strips. Place all four in the developer and take out the first at the end of the first minute, the second after two minutes and so on. On comparing these strips we shall see that while they all give the same quantity of detail they differ in density contrast, and learn that with metol it is a case of detail first and density afterwards. Prolonging the duration of exposure it will give density contrast. But where prolonged development is called for it is advisable to use a little bromide. With metol the

proportion of bromide need not be more than ½ gr. per oz. of mixed developer and often ¼ gr. will be found ample. With very brief exposures or subjects of strong light and shade contrasts the bromide may be omitted and the normal solution diluted with an equal quantity of water.

Under normal conditions the image appears in five to ten seconds, and for the degree of contrast required for a soft P.O.P., we shall find that a negative which appears in 10 seconds will need developing for about 20 times this period, say 3½ minutes; but for a bright result the factor will have to be 30 or a total time of five minutes. The beginner with metol is advised to work with watch in hand or better still some form of dark-room clock, because when the image comes out somewhat quickly one's guess work estimate of time is apt to go astray, and as density grows comparatively somewhat slowly there is a probability of under-developing.

QUINOL.

Hydrokinone or Quinol—Also known as pyroquinol, hydrochinone, hydroquinone. Chemically it is known as para-di-oxy-benzine, being a close relation of pyrocatechin and resorcinol. It comes to us either as tiny flake or needle crystals of nearly white colour. On continued exposure to the air it turns brown and loses its photographic usefulness. It is soluble in about 17 times its own weight of water, but requires some preservative to keep it in working order for any length of time. Quinol has the distinction of being the pioneer among later-day alkaline developers, and was introduced by Captain Abney in 1880, who at first suggested its use in conjunction with ammonia, and subsequently replaced this by potassium carbonate. Subsequent experience has shown the desirability of using the caustic alkalis (potash or soda). But in this case a small quantity of bromide is required.

Quinol may be regarded as the opposite or complement of metol as regards the way it brings out the image. With quinol the shadow detail does not come up until the high-lights have acquired some considerable density. Hence this agent is usually regarded as a density rather than detail

producer. Probably metol and quinol would give equal detail and density if in each case the action was carried on to the exhaustion stage. But then it is seldom that we wish to go on to this stage. Quinol is certainly very useful for making negatives where bright, plucky results are desired; for instance, copying maps, plans, diagrams, or for making bright transparencies from somewhat over-exposed thin negatives.

For portrait, interior, and general landscape work the proportion of bromide should be kept low, a full exposure given, and development not carried too far.

The following formulæ are reliable :—

		For soft results.	For strong contrasts.
A.	Water	10 ozs.	10 ozs.
	Potass metabisulphite	40 grs.	60 grs.
	Quinol	60 grs.	75 grs.
	Potass bromide	5 grs.	30 grs.
B.	Water	10 ozs.	10 ozs.
	Soda sulphite	1 oz.	1 oz.
	Caustic potash	60 grs.	50 grs.

Use equal parts of A. and B.

Quinol is particularly sensitive to changes of temperature, and therefore unsuited to winter work in dark-rooms not kept up to 65° F.

Stale solutions are liable to give stained negatives. This stain seems to partake of the nature of some form of reduced silver, for it can be (usually) removed by a dilute ferricyanide and hypo reducer. Where the solution A is likely to be kept beyond a week or two it is well to use distilled water and slightly increase the metabisulphite.

Quinol negatives seem to lose rather more than the usual apparent density in the fixing bath, hence the need for a little careful observation in this direction on the part of the beginner.

The following one solution formula is excellent for use when it can be all used up within 24 hours of preparation :—

Water, 10 ozs.; soda sulphite, 2 ozs.; potass carbonate, 2 ozs.; quinol, 90 grs.

Quinol with Formalin is an interesting combination which works admirably.

Water, 1 oz.; soda sulphite, 60 grs.; quinol, 5 grs.; formalin, 6 to 8 minims.

But care must be taken to guard against over-exposure.

Quinol with Acetone.

Water, 1 oz.; soda sulphite, 60 grs.; quinol, 5 grs.; acetone, 30 to 40 minims.

In cases of doubtful exposure use only half the acetone until the image appears, the second half can then be added if required.

Quinol with Ferrocyanide.—It is claimed that the addition of potass. ferrocyanide ("yellow prussiate") reduces the time of development and gives brighter, fogless results. The present writer fails to find any material advantage from this addition, but gives a well-recommended formula.

Water, 3 ozs.; soda sulphite, 35 grs.; quinol, 12 grs.; potass ferrocyanide, 100 grs.; potass bromide, 3 grs.; caustic soda, 50 grs.

ORTOL.

Ortol is said to be a combination of ortho-methyl-amido-phenol-sulphate and para-di-hydroxyl-phenol. It is sold as a nearly white fine powder, fairly soluble in water, yielding an acid solution. With ferric-chloride we get a deep purple brown colour. With silver nitrate silver is precipitated as a fine grey powder.

Our own favourite formula is as follows:

A. Water, 10 ozs.; potass metabisulphite, 60 grs.; ortol, 80 grs.; potass bromide, 10 grs.

B. Water, 10 ozs.; soda carbonate, 1 oz.; soda sulphite, 1 oz.

Use equal parts of A and B.

Other formulæ are as follows:—

Ortol Solution;			
Water	10 ozs.	10 ozs.	10 ozs.
Ortol	65 grs.	70 grs.	70 grs.
Potass metabisulphite.	32 grs.	30 grs.	35 grs.
Potass bromide	...	5 grs.	8 grs.
Hypo	...	...	2 grs.

Fig. 16.

OVER-EXPOSURE. BRIEF DEVELOPMENT.

Fig. 17.

OVER-EXPOSURE. PROLONGED DEVELOPMENT.

A. Slight under-exposure. Short Development.
B. ,, ,, ,, Normal Development.

Fig. 18.

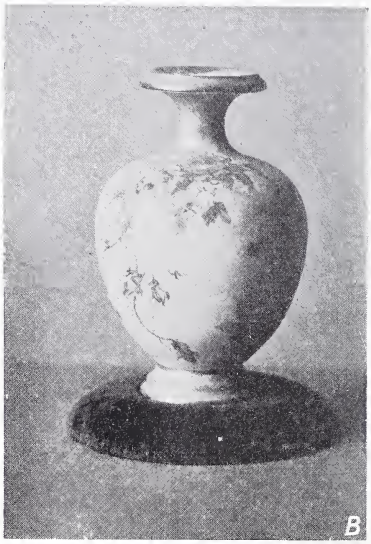


Fig. 19.

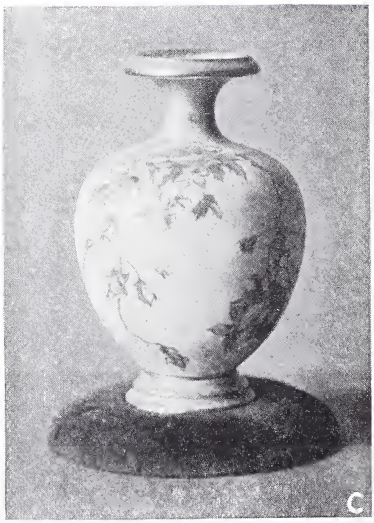


Fig. 20.

Fig. 21.

H. W. Bennett.

C. Correct Exposure. Correct Development.
D. ,, ,, Long Development.

C. Correct Exposure.
E. Under-Exposed.

Developed together for the same time.

Fig. 22

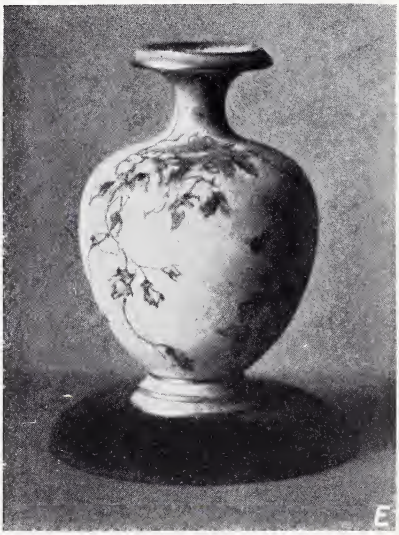


Fig. 23.

Fig. 24.

Fig. 25.

H. W. Bennett.

F. Under-Exposure. Developer diluted 1-8, and extra alkali added.
G. ,, ,, Normal Developer.

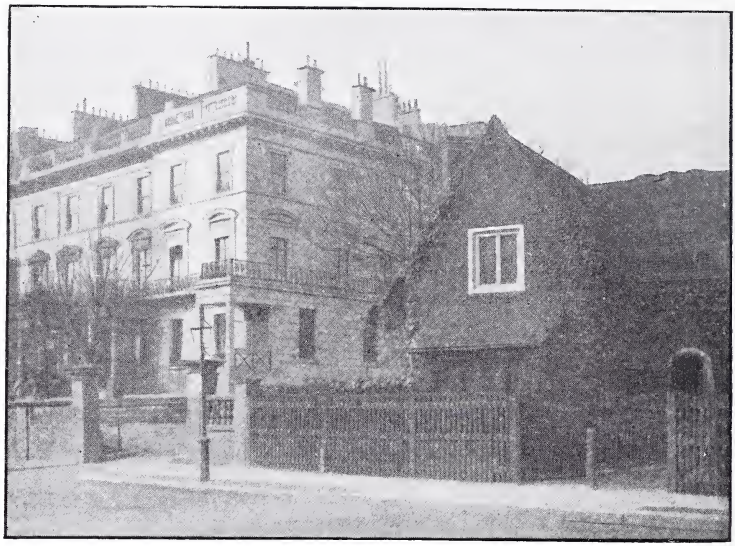


Fig. 14.
CORRECT EXPOSURE. BRIEF DEVELOPMENT.

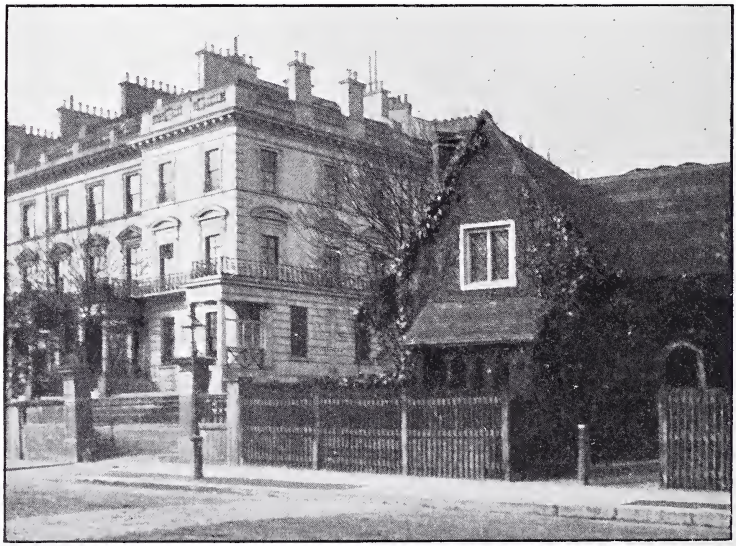


Fig. 15.
CORRECT EXPOSURE. PROLONGED DEVELOPMENT.

Fig. 12.
UNDER-EXPOSED. BRIEF DEVELOPMENT.

Fig. 13.
UNDER-EXPOSED. PROLONGED DEVELOPMENT.

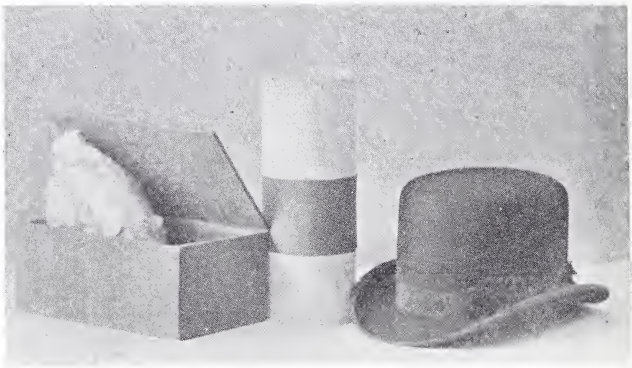


Fig. 26.

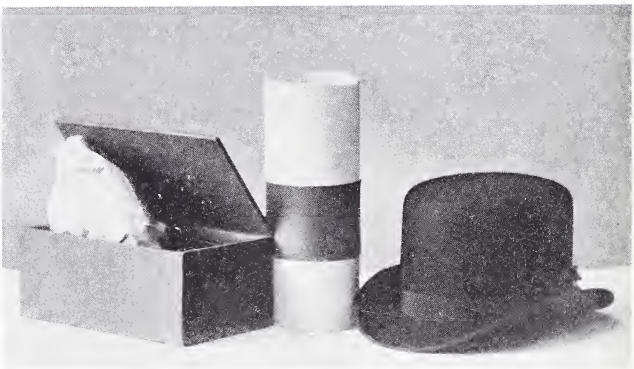


Fig. 27.

The exposure of the negatives of figs. 26 and 27 were identical and considerably longer than was needful for normal development. Fig. 26 shows the result of pyro-soda development *without* bromide. Fig. 27 shows the effect of pyro-soda *with* as many grains of bromide as of pyro.

Objects depicted: Black felt hat. Roll of white blotting paper, with central band of orange paper. Brown paper box.

Alkali Solution:			
Water	10 ozs.	10 ozs.	10 ozs.
Soda sulphite	1½ ozs.	1 oz.	1 oz.
Soda carbonate	1 oz.	...	1 oz.
Potass carbonate	...	¾ oz.	...

In all cases equal parts of the ortol and alkali solutions are to be mixed before use.

These solutions keep fairly well for some weeks.

The addition of hypo as given in one formula is of very doubtful utility and not recommended.

At temperatures 55°—60° the image usually appears in about 40—45 seconds; at temperatures 65°—70° the time is shortened to 30—35 seconds. The image grows very steadily and regularly in the manner familiar to pyro workers. The colour of the image is a good colourless black. The same solution may be used for three or four plates in succession, but grows slower in action with each use. Caustic alkalis, ammonia or acetone are not recommended for use with ortol. If the stock ortol solution be kept too long it discolours and then may stain the gelatine film and fingers. It is claimed for ortol that frilling is unknown with it below 70°F. Ortol with soda sulphite only will develop an image, but too slowly to be practically useful. Staining results if no sulphite or metabisulphite or other similar preservative be used. By reducing the quantity of alkali the action is slowed. The above proportions should not be exceeded. Bromide may be omitted when the exposure is known not to be excessive. Ortol is a developer very suitable for the beginner, as its action is so steady.

RODINAL.

Rodinal is a commercially prepared solution of paramidophenol hydrochloride with alkali and preservative. This solution at first is a pale sherry colour, but darkens with age. It retains its activity for a long time. Hence, seeing that it only needs the addition of water, it forms a convenient preparation for those who only wish to develop at irregular intervals. For normal results with fairly correct exposure the degree of dilution is one to thirty. That is to say, to develop a *half-plate* negative take *half a dram* of rodinal and dilute with 2 ozs. water.

For a quarter-plate take a quarter dram rodinal and dilute with one ounce. For over-exposure increase the proportion of rodinal to one in fifteen water. For under-exposure reduce the rodinal to one in sixty water. For strong solutions, *i.e.*, more than one in twenty, it is well to add two or three drops of a 10 per cent solution of potossium bromide per oz. of developer. When dealing with doubtful exposures it is better to begin with a weak solution, say five min. rodinal per oz. water with one drop bromide solution. Then when the image is visible make any needful alterations. With rodinal there seems to be a marked loss of strength in the fixing bath, as is the case with quinol, but rodinal is more like metol than quinol in its general character.

A one in twenty strength will probably bring out the image if fairly correctly exposed in ten to fifteen seconds, and density contrast will be sufficiently strong in about thirty times this period, say five minutes.

Rodinal does not seem to have any staining propensities.

Unal is rodinal sold in the form of a grey white powder. This merely requires dissolving in water to form a developer. It is an obvious convenience for the tourist. Unal is conveniently put up in small glass capsules. The contents of one capsule being dissolved in $3\frac{1}{2}$ ozs. water gives a solution equivalent to one part rodinal in twenty-five parts water (4 per cent).

PARAMIDOPHENOL.

Paramidophenol or Paranol is a finely crystalline white powder, freely soluble in water, yielding an acid solution. It may be used in conjunction with the carbonic or caustic alkali, the former being the favourite. It acts steadily, and if given moderate time yields abundant density. It is but little affected by temperature, and has not inherent fog-giving tendency.

Two-solution formula:

A. Water, 10 ozs.; paramidophenol, 50 grains.
B. Water, 10 ozs.; soda sulphite, 250 grains; potass. carbonate, 250 grains.

Take 1 part A, add 2 parts B.

Concentrated single solution formula :

In 5 ozs. water dissolve 1½ ozs. potass. metabisulphite, then add ¼ oz. paramidophenol.

Now prepare saturated solution of caustic soda, and add this very slowly to the stock solution until the salts precipitated are just re-dissolved. Normally one part of this stock solution is diluted with 15 parts of water, but the degree of dilution may vary from 10 to 30 or more. A few drops of a 10 per cent. solution of potass. bromide may be added per ounce of developer if the plates show a tendency to fog.

Lithium carbonate has been used, as the alkali with paramidophenol, as follows :

Water, 10 ozs. ; soda sulphite, 2 ozs. ; paramidophenol, 60 grains ; lithium carbonate, 60 grains.

This may be regarded as a maximum strength to be diluted with one or two volumes of water as required.

AMIDOL.

Amidol or Dianol are abbreviations for di-amidophenol. This is a sparkling powder that according to age may be anything from a pale grey to black. Discoloration, however, seems to have but slight effect on the activity of the powder, though amidol in solution does not keep its power more than a few hours. It is therefore desirable to prepare only just as much developer as is likely to be used during the day. Fortunately it is dissolved in water very readily.

One of the interesting features of amidol is that with soda-sulphite without any alkali we have a developer giving satisfactory results in three or four minutes. There are, of course, other developers that may be used without alkali, but most of them work too slowly to be practically useful.

If in 10 drams water we dissolve 1 drm. soda sulphite, and then throw in 2 grs. amidol, this quickly dissolves and gives us a developer which will probably bring out an image in 10 seconds and give good printing density in three or four minutes. Our negative probably will show some signs of fog. This suggests that a trace of bromide should be present. We shall probably find half a grain of bromide per ounce of developer will moderate its action and give us a fog-free negative.

Formulæ.—

Water, 10 oz.; soda sulphite, 250 gr.; amidol, 20 gr.

To be used undiluted.

Water, 10 oz.; soda sulphite, 1 oz.; potass. bromide, 5 gr.

This keeps for a long time. When to be used take one ounce of this and add 2 gr. amidol. Stir well and use at once.

Water, 10 oz.; soda sulphite, ½ oz.; potass. bromide, 5 gr.; citric acid, 5 gr.; amidol, 25 gr.

Use freshly prepared. This gives vigorous contrasts.

Amidol is excellent for producing bright and vigorous negatives of good quality, *i.e.*, black, free from colour. With correct exposure and clean working plates bromide is not necessary, though a little may be advisable. The image appears in about 10 seconds, and the full time is generally about 4-5 minutes. For extreme cases of under-exposure a few drops, say 10, of a 10% solution of potassium carbonate may be added per ounce of developer.

Amidol or dianol is a very useful developer on account of its ready solubility, freedom from stain, rapid action and simple formulæ relations.

DIANINE.

Dianine, *i.e.*, Di-amido-resorcin. A fawn-coloured powder, easily soluble in water, yielding a pink-yellow solution. In general character, bearing a resemblance to dianol or amidol. Thus with a dilute solution of soda sulphite only it gives a a practical and energetic developer. Increasing the sulphite accelerates its action. Over-exposure, if not excessive, is amenable to the retarding influence of bromide.

(1) The maker's formula is—water, 100 parts; *anhydrous* soda sulphite, 3 parts; dianine, 1 part.

(2) I prefer the following;—Water, 10 ozs.; soda sulphite *crystals*, 5 drms.; dianine, 50 grs. With this the image appears in from 10 to 12 seconds, and development for moderate density is complete in five minutes.

The resulting negatives are free from stain of good black colour, printing quickly.

Fig. 28. WHITE ROSES R. Robinson.

Fig. 29. FEEDING THE POULTRY J. H. Saunders.

PRINT CRITICISM PRIZES.

Eikonogen literally means picture or image producer, and so tells us nothing about its chemical nature. This has been given as sodium amido-naphthol-sulphonate. When fresh it is a pale yellow powder, that darkens if exposed to the air too long. One part is soluble in 10 of hot water (F. 110°) and in 20 parts of cold water (F. 60°). It resembles metol in the way it brings out detail before any great density is attained, though ample density can be obtained with long enough time. It is free from staining propensities. Generally speaking it is admirably suited for portraiture interiors and other cases where shadow detail is wanted without great density contrasts.

My own favourite formula is as follows :—

Water, 10 oz. ; potass. metabisulphite, 100 gr. ; eikonogen, 120 gr. ; soda carbonate, 1 oz.

This may be diluted with an equal quantity of water for soft results, or used "neat" for brighter effects.

Another formula by a noted portraitist :—

Water, 10 oz. ; soda sulphite, 200 gr. ; eikonogen, 50 gr. ; potass. carbonate, 100 gr.

For those who want a more energetic formula and who do not mind the greasy feel of caustic alkali :—

Water, 10 oz. ; soda sulphite, 120 gr. ; caustic soda, 60 gr. ; eikonogen, 60 gr.

Some two-solution formulæ are given below.

A. Water, 10 oz. ; potass. bromide, 10 gr. ; eikonogen, ½ oz. ; soda sulphite, 1 oz.
B. Water, 10 oz. ; soda carbonate, ½ oz.

Use equal parts A and B. This is suitable for those workers who habitually over-expose their plates.

Another convenient form is :—

A. Water, 10 oz. ; soda sulphite, 300 gr. ; eikonogen, 60 gr.
B. Water, 10 oz. ; potass. carbonate, 300 gr.

Use equal parts A and B.

Before throwing away Eikonogen powder which has discoloured by age first try by experiment if it has not retained its developing power despite its colour.

PYROCATECHIN.

Pyrocatechin, pyrokatekin, brenz-catechin, pyrocatechol are all identical with ortho-di-oxy-benzine. This is a white crystalline powder, not unlike quinol in general appearance, and is soluble in alcohol, ether and water. In solution it does not keep very well, turning greenish-brown and then black. Lead acetate throws down a white precip'tate,a test which separates pyrocatechin from quinol and resorcinol. As a developing solution, it seems free from staining and fog-giving propensities, yielding a greyish-black image of good density.

The present writer's favourite formula is :—

(1) Water, 8 ozs. ; soda sulphite, 1 oz. ; when dissolved add pyrocatechin, 80 grs. ; and finally, caustic soda. 50 grs. For use take one part with three parts water.

Other formulæ :—

(2) Water, 4 ozs. ; soda sulphite, 1 drm. ; pyrocatechin, 20 grs. ; potassium carbonate, 3 drms. ; *or* trisodic phosphate, 200 parts ; *or* caustic soda, 4 grs.

(3) Stock concentrated solution. Water, 14 ozs. ; soda sulphite, 3½ ozs. ; pyrocatechin, 300 grs. ; caustic soda, 220 grs. Prepare with distilled or well-boiled water. Store in small bottles, well-corked. Use one part of stock solution with 12 to 20 parts water.

At temperature 60°F. the image appears in about 10 seconds, with formula (1) and a soft portrait negative obtained in just about three minutes. For warmer temperatures, 1 part formula (1) and 4 parts water are recommended. In this case the image will probably appear in about 20 seconds, and we can also speak well of the next formula.

(4) Water, 10 ozs. ; soda sulphite, 100 grs. ; pyrocatechin, 50 grs. ; soda carbonate, 500 grs.

With this, the image appears in about 1¼ minutes and grows steadily, requiring about 10 minutes to give moderate printing density.

Pyrocatechin seems in general character and results to resemble quinol and kachin. With normal exposures, it gives clear bright fogless negatives of good printing quality. With reasonably correct exposures, bromide does not seem to be necessary.

KACHIN.

Kachin.—There is a wide-spread and not unreasonable prejudice against the use of such names as kachin, synthol, etc., which tell us nothing whatever about the chemical composition of the material. This discourages experiment and hinders their popularity. Kachin is sent out as a white crystalline powder and keeps well. It is fairly soluble in water, not particularly sensitive to temperature or bromide, does not stain plates or fingers or induce skin troubles. Indeed it has been stated that it gives with stale plates less of that too familiar age stain along the edges that most other developers give. A 5 per cent solution of borax has been proposed as a restrainer.

Formulæ:—

	A.	B.	C.
Water	10 ozs. ...	10 ozs. ...	10 ozs.
Soda sulphite ...	½ oz. ...	2½ ozs. ...	80 grs.
Kachin	60 grs. ...	200 grs. ...	15 grs.
Soda carbonate...	½ oz. ...	...	
Soda caustic	...	150 grs. ...	
Potass. carbonate	...	...	150 grs.

My own favourite formula is marked A (first column). B is a convenient stock solution. For use take one part of B and add nine parts water for ordinary use. For softer effects use less water and stop development at an early stage. C is a formula for stand development, occupying from a quarter to half an hour.

Two solution formulæ:—

A. Water, 8 ozs.; soda sulphite, 350 grs.; kachin, 70 grs.
B. Water, 8 ozs.; caustic soda, 50 grs.

For use take one part A, one part B, and four parts water.

A. Water, 10 ozs.; soda sulphite, 450 grs.; kachin, 90 grs.
B. Water, 10 ozs.; soda phosphate, 850 grs.; caustic soda, 90 grs.

This has been recommended for snap-shot work, using equal parts of A and B. It is, however, preferable, with brief exposures, to commence operations with a dilute developer, and then use that just given.

ADUROL.

Adurol.—This occurs in two closely allied forms which must not be confounded. Adurol Schering is bromo-hydrokinone; Adurol Hauff is chloro-hydrokinone. Thus both may be regarded as children of the common parent quinol. Both possess certain advantages over their parent.

Quinol in water only is not a practical developer, but both the adurols may be used in this way. Their action is, however, inconveniently slow. A. Schering is more soluble than A. Hauff, which in turn is more soluble than quinol. Quinol with alkaline carbonate is a slow acting developer. The adurols both act quite quickly enough with carbonate, A. Schering being the more rapid of the two.

Quinol again is considerably affected by temperature. This is not nearly so much the case with the adurols.

Bromide has a much more strongly marked effect upon quinol than on the adurols. These are all points in favour of the adurols. A. Hauff is the nearer of the two in general character to quinol. Both the adurols are light-coloured powders, keeping well in this form. An acid fixing bath is recommended with A. Schering, but it is not essential. The image appears sooner than with quinol; usually in about 20 seconds. Full development may take four or five minutes. The same developing solution may be used several times. There seems no tendency to stains or fog.

Both the adurols keep very fairly well in the solutions given below. Their solutions have a slight but characteristic odour suggestive of resin.

Single solution developers.

	A.	B.	C.	D.	E.
Water	10 ozs.	10 ozs.	10 ozs.	10 ozs.	10 ozs.
Adurol Hauff	½ ,,	...	40 grs.	60 grs.	...
Adurol Schering	...	3 drs.	...	...	30 grs.
Soda sulphite	4 ,,	3 ozs.	5 drs.	1 oz.	½ oz.
Potass. carbonate	3 ,,	3½ ,,	3½ ,,	...	...
Soda carbonate	...	...	...	1½ ozs.	1 oz.
Potass. bromide	...	...	10 grs.	...	...

Fig. 30. S. R. Somerford

South Aisle, Ely.

A. Use one part A with 3 to 5 parts water.
B. Use one part B with 5 to 7 parts water.
C. This may be used neat or with equal parts water.

D and E are the writer's favourite formulæ.

These bring out an image in about 20 seconds and take about four minutes for a soft printing negative, the solutions D and E are used as above given.

Two solution developers—

A. Water, 10 ozs.; soda sulphite, 1½ ozs.; adurol Hauff, 85 grs.
B. Water, 10 ozs.; potass. carbonate, 1 oz.

Use equal parts A and B, or dilute with one part water for soft effects.

Or,

A. Water, 10 ozs.; soda sulphite, 1½ ozs.; adurol Schering, 1 drm.
B. Water, 10 ozs.; soda carbonate, 2 ozs.

Use equal parts A and B.

GLYCIN.

Glycin is an abbreviation for Para-oxy-phenyl-glycin. This is a pale yellow powder which seems to keep its developing qualities for a long time without being much affected either by air or age. It is more soluble in hot than in cold water. Its chief character is its slow and steady action, rendering it in dilute solution a favourite for stand development (*q.v.*, page 60). With the usual preservatives it keeps fairly well. With a reasonably correct exposure no bromide is necessary with a good, clean-working plate. Two cautions are very necessary, *viz.:* Great care to avoid hypo contamination, which will yield stains; and, secondly, the avoidance of excess of alkali, as this is apt to produce dichroic fog.

Under proper conditions glycin will yield bright, clean, well-graduated negatives of good printing colour and quality.

Glycin has acquired the reputation of giving an extra fine grain character of deposit, and so become a favourite with microscopic workers and those who make negatives for enlargement.

The following I find convenient proportions :—

Water, 1 oz.; soda sulphite, 20 grs.; glycin, 5 grs.; soda carbonate, 30 grs.

This brings out an image in just about one minute, and development is complete in 5 to 6 minutes for a fairly soft printing negative.

Other reliable formulæ are as follows :—

Water, 10 ozs.; glycin, 100 grs.; soda sulphite, 100 grs.; pot carbonate, 100 grs.

Water, 10 ozs.; soda sulphite, 1 oz.; glycin, 50 grs.; soda carbonate ½ oz.

Stand developers :—

Water, 20 ozs.; soda sulphite, 2 ozs.; potass carbonate, 100 grs.; glycin, 20 grs.

Water, 20 ozs.; soda sulphite, 1 oz.; glycin, 50 grs.; soda carbonate, 100 grs.

The following two-solution formula is worth noting as giving us convenient process of modification :—

A. Water, 10 ozs.; soda sulphite, ½ oz. : glycin, 50 grs.; potass bromide, 5 grs.

B. Water, 10 ozs.; pot carbonate, 1 oz.

For thin, delicate results use 4 parts A and 1 part B. For medium density effects use 4 parts A and 2 to 3 parts B. For vigorous negatives use 4 parts B and 2 parts A to begin with, and add 2 parts more of B when the action seems to be slowing down, or if the plate has been briefly exposed.

IMOGEN SULPHITE.

Imogen Sulphite has been described as "a sulphonic derivative of catechol," a statement chiefly remarkable for its indefiniteness. It is sold as a light-coloured powder, and is perhaps the cheapest of the newer agents, being something less than a shilling an ounce. It is freely soluble in water, and gives a light, yellow solution, acid in reaction. This solution keeps fairly well for some time, but its action slows with age. The negatives obtained by this developer are of a good, grey black colour, clean, bright, and free from fog when good plates are used, and the exposure has not been markedly excessive. The first formula tried was as follows :

A. Water 12 parts, imogen 1 part.

B. Cold saturated solution of washing soda (carbonate).

For normal exposures two parts A and one part B. For brief exposures two parts A, one part B, two parts water. For full exposures equal parts A and B, plus half a grain of potassium bromide per oz. developer. A few experiments prompted our modifying the above formula to that now given.

A. Water 8 ozs., soda sulphite ½ oz., imogen 1 drm.
B. Cold saturated solution soda carbonate.

For normal exposure use 2 parts A and 1 part B. For portrait negatives add 1 part water. Mr. Bothamley's formula is noteworthy, and has the advantage of avoiding such variable quantities as saturated solutions.

A. Water 1000 parts, soda sulphite 100 parts, imogen sulphite 12 parts.
B. Water 1000 parts, soda crystals 200 parts.

Use equal parts of A. and B.

In general, I find that under ordinary conditions the image puts in an appearance just about the end of the first minute, and that density grows very regularly and steadily, yielding us a moderate density range suitable for a bright P.O.P. in about four minutes. This developer is one of those which seems to be especially sensitive to temperature variations. A small quantity of bromide such, for instance, as half a grain (or even less than that) per oz. of mixed developer, has an appreciable effect and prolongs the time taken for obtaining the moderate density stage, as compared with the time required for the same stage without bromide.

It does not seem to stain plates, papers or fingers, and yields bright, quick-printing negatives. Imogen appears to be particularly well adapted for the traveller, seeing that he need only carry with him a little of the powder and rely on obtaining water and washing soda crystals where he desires to develop an occasional test exposure.

DIOGEN.

Diogen, otherwise known as amido-naphthol-monosulphate, is a fawn-coloured powder dissolving easily in water and yielding a fine yellow coloured acid solution. Experiments were made with the following proportions. Water, 10 ozs.; soda sulphite crystals, 5 drms; soda carbonate, 5 drms.;

diogen, 80 grs. This brings out an image in just over half a minute, and gives ample density in five or six minutes. The addition of 1 grain of potass. bromide per oz. of developer prolongs the time of appearance to about a minute. The negatives are of a good black colour and good gradation, printing quite satisfactorily.

The maker suggests a concentrated stock solution of water, 10 ozs.; soda sulphite, 4 ozs.; diogen, 1 oz.; potass. carbonate, 5 ozs. For normal exposures take ½ oz. stock solution, 2 ozs. water and 1-5 gr. potass. bromide. For under-exposure omit the bromide and dilute the developer.

For tentative development take stock solution, 85 min.; water, 3½ ozs.; potass. bromide, 1-5 gr. If the image appear in 4 minutes at temperature 68° F. the plate is correctly exposed.

SYNTHOL.

Synthol among the modern developers seems to be the only English-made one with which the present writer has any acquaintance. It is stated to be di-amido-orcinol-hydrochloride. It is issued as a light-coloured powder, varying from a pale grey pink to a light coffee brown. Unlike most of its "made in Germany" rivals it is not a coal-tar product, but is prepared from certain lichens, thus reminding one of the early gallic and pyrogallic developers in being directly obtained from the vegetable kingdom. It is freely soluble in water, slightly soluble in alcohol, and insoluble in ether. In solution ferric chloride gives with synthol a violet-red colour, and with amidol a blood-red colour. Alkaline reagents with synthol yield a violet or brown-red colour, but with amidol give a blue colour. These tests dispel the notion that synthol is but amidol under another name. Nor is it identical with orcin, which is soluble in water, alcohol and ether and yields with ferric chloride a red colour.

The following formula gave excellent results:—

Water, 10 ozs., soda sulphite (pure), 300 grs., synthol, 30 grs.

If the solution shows some small insoluble particles it is desirable to remove them by filtering. The

solution above quoted is of pale yellow colour, and forms our one solution developer. This does not seem to stain plates, paper or fingers.

With the above developer the image will probably appear in about 15 or 20 seconds, and development for a portrait negative may take 5 or 6 minutes altogether.

It is most important to use a good quality sulphite of soda. The writer at first was sadly disappointed with the results obtained with synthol, but the cause was traced to the use of a very impure sulphite.

Reducing the proportion of soda sulphite has a retarding action. The addition of one grain of bromide per oz. of developer had also a marked retarding effect.

Increasing the proportion of synthol has no material effect unless the sulphite be increased at the same time.

Synthol gives a good black colour with normal exposure, and a warm black with treble exposure and three grains of bromide per oz. of developer.

Synthol resembles amidol in only requiring the addition of soda sulphite to yield a practical developer.

Solutions of synthol have a peculiar earthy odour which is very characteristic.

Alternative formulæ :—

Water, 4 ozs., soda sulphite, 160 grs., synthol, 30 grs.

In cases of doubtful exposure it is better to dilute the above with an equal quantity of water. For minimum exposures to each oz. of normal developer add 1 gr. potass bromide and 1 min. liquid ammonia, adding another drop of ammonia as soon as the developer ceases to smell of ammonia.

Two solution developer :—

A. Water, 10 ozs. ; potass. metabisulphite, 6 drms. synthol, 1 drm.
B. Water, 10 ozs. ; soda carbonate, 1 oz.

Mix equal parts of A and B just before use.

Hypo has a strong retarding effect with this reagent, therefore great care must be taken to keep the fingers away from the fixing bath during development.

HYDRAMINE.

Hydramine is a sparkling greyish powder, not very readily soluble in water, said to be a compound of phenylendiamine and hydrokinone. The makers recommend the following formula :—

(1) Water, 1000 parts; anhydrous sulphite soda, 15 parts; caustic lithia, 3 parts; hydramine, 5 parts. For under-exposure, more caustic lithia may be added, while for over-exposure, a few drops of 10 per cent. solution of potassium bromide is recommended.

(2) My own experiments were made with the following: A. Water, 4 ozs.; soda sulphite crystals, 1 drm.; hydramine, 10 grains. B. Caustic potash, 8 grs.; water, 1 oz.

The hydramine in A is not dissolved until about 2 drams of B (*i.e.*, 2 grains of caustic alkali) are added per oz. of B. This then forms a clear yellow solution, which brings out an image in about one minute, and yields a good black image of moderate density in 5-6 minutes.

This agent deserves to be better known.

EDINOL.

Edinol.—One of the latest additions to the photographer's battery of developers, and is said to be Ortho-amido-meta-oxy-benzil-alcohol-chloride. The material called edinol comes to us as a greyish fawn-coloured powder, easily soluble in cold water, yielding a sherry-coloured liquid giving an acid reaction with litmus. The plain aqueous solution slowly darkens in colour on keeping.

The following formula proved satisfactory :—

A. Water, 7 ozs.; soda sulphite, 5 drms.; edinol, 30 grs.
B. Water, 7 ozs.; soda carbonate, 5 drms.
C. Water, 7 ozs.; caustic soda, 20 grs.

For fully-timed exposures use 4 parts A with 1 or 2 parts B.

For normal conditions, *i.e.*, correct exposure, use 4 parts A with 3 or 4 parts B.

For the briefest practical exposures (snap-shot and high-speed work) use equal parts of A and B.

The mixing of A and B yields a sherry or port-coloured solution, which normally begins to show an image in about half a minute.

Edinol yields good neutral black images with conspicuous freedom from fog with good plates. It is a valuable addition to our list of developing agents. In many respects it has a resemblance to metol and ortol.

Stock solutions in conjunction with soda sulphite, potass. metabisulphite or acetone sulphite keep a long time.

Alternative Formulæ:—

A one-solution Developer: Water, 8 ozs.; potass. metabisulphite, 1 oz.; edinol, 1 oz.; soda hydrate (caustic soda), ½-oz. Water to make total bulk 10 ozs. For use take 30 to 40 mins. with 1 oz. of water.

Miethe's Formula: Water, 100 parts; potass. metabisulphite, 2 parts; edinol, 1 part; potass. carbonate, 6 parts.

Precht's Formula: Water, 100 parts; soda sulphite, 8 parts; edinol, 1 part; acetone, 10 parts.

A Vigorous Developer: Water, 100 parts; soda sulphite, 6 parts; edinol, 1 part; soda tri-phosphate, 6 parts.

Standard Formulæ (in ounces):—

	A		B		C
Edinol	1	.....	1	.....	1
Water	10	.....	10	.....	40
Acetone sulphite	1	.. ...	...	.....	...
Potass. metabisulphite	...	.....	1	.....	...
Soda sulphite	...	.....	...	.....	10
	D		E		F
Water	3	.....	3	.....	9
Soda carbonate	1	.....	...	.....	...
Potass carbonate	...	.....	1	.....	...
Soda hydrate	...	.....	...	.....	1

For each ounce of developer required take 40 mins A or B, or 160 mins: C, add 80 mins: D, or 80 mins: E or 10 mins. F, and make up to the required quantity with water.

Restrainer: G, 10 per cent. potass. bromide; H, saturated solution soda bicarbonate.

For over-exposed plates add 10 mins. of G or 160 mins. H to each ounce of mixed developer.

Restrainers.—Soda *bi*-carbonate and borax have been recommended. One grain of potass. bromide per ounce of mixed developer certainly has a marked effect.

The above mixtures do not seem to stain plates, paper or fingers.

FERROUS OXALATE.

Ferrous Oxalate Developer.—This developer was introduced to the notice of photographers about 1877. By its aid Hurter & Driffield laid the foundation of their world-famous plate-testing researches. Although this developer has now about a score rivals, it yet retains a forward place with experimentalists, owing to its valuable property of not reducing—*i.e.*, "developing" silver bromide that has not been affected by light. In other words, it does not yield chemical or developer fog. It is fairly cheap, easy to prepare, and easily influenced by restrainer or accelerator, but does not keep very long. It does not seem to affect the skin, or stain gelatine films or papers. A small trace of hypo or pyro induces troubles. Hence the operator must keep dishes and fingers scrupulously clean.

Ferrous oxalate itself is a yellow powder, but very slightly soluble in plain water, but freely soluble in alkaline oxalate solutions.

An Experiment.—Prepare cold saturated solutions of potassium oxalate and ferrous sulphate (protosulphate of iron, green vitriol). Call them O and F respectively. If now to, say, half an ounce of O we add, drop by drop, some of F, we observe a change of colour from pale to deeper yellow, and on to orange, until we have increased the volume about one-fourth or one-fifth, when the solution begins to turn muddy and a precipitate (of ferrous oxalate) is thrown down. Increasing the F does not redissolve this precipitate. If we now reverse operations and add O to F, we find a precipitate formed at once. Hence we rightly infer that when mixing our developer the iron solution must be added to the oxalate solution, and *not vice versa.*

Normal Developer.—It is desirable to use either distilled or filtered rain water.

A. Water, 4 parts; potassium oxalate, 1 part.
B. Water, 3 parts; ferrous sulphate, 1 part; citric or sulphuric acid, $\frac{1}{100}$th part.
C. Water, 10 parts; potassium bromide, 1 part.
D. Water, 25 parts; "Hypo," 1 part.

On Lake Windermere.

Fig. 32. J. A. Dickie.

Fig. 33. E. Hoppe.

The Violinist.

Hot water should be used for A. If tap or well water be used a milkiness may be produced by lime present. This should be allowed to settle, and the clear part decanted or filtered off for use. Tepid water (not warm) should be used for B. C and D will apparently keep indefinitely. B is at first a bright pale green colour, but presently turns yellow and then brown. It should be discarded as soon as any distinct change of colour has set in.

Preservatives of various kinds have been proposed for keeping B in working order.

(1) If distilled and boiled water be used, and the solution stored in small bottles filled to the cork, and the cork waxed, the solution will keep a long time.

(2) A large stock bottle may be used, and enough olive, or castor oil, or paraffin, poured in to form a $\frac{1}{4}$-inch thick layer on the top of the solution. This keeps off air contact. The solution is drawn off as required by a tap in the lower part of the bottle, or by a syphon tube with rubber end and spring pinch cock.

(3) The upper part of the bottle may be filled with household gas to displace the atmospheric air.

(4) A knitting needle or piece of piano wire broken up into inch lengths and thrown into the solution.

But in all cases a freshly-prepared solution is preferable.

Normal Proportions.—For a fully but not excessively exposed plate, on a subject of moderate light and shade contrasts, take 4 ozs. A, add to this, slowly, 1 oz. B, and add also 10 minims C. Under normal conditions the image grows steadily and yields moderate density contrasts free from fog in about four minutes.

Restrainer.—If the exposure be known to be correct then a restrainer is not really necessary, nevertheless a trace is desirable if a bright looking negative is desired. It is also advisable in such cases to use five parts A and one part B.

Accelerator.—For this purpose the dilute solution of hypo D is used. To each ounce of mixed developer we may add as much as 20 mins. of D, but this is our maximum limit. In general it will be

found that two or three drops of D per oz. of developer will produce a sufficiently marked effect. It is, however, advisable to dispense with D altogether when possible.

Cleanliness.—It is a desirable precaution to rinse out developing dishes, and also one's fingers, with a 5 per cent solution of citric acid, to prevent any trace of hypo being carried into the developer.

Clearing Bath.—We have seen that the soluble oxalate will, with water containing lime, throw down a precipitate (oxalate of lime). Therefore we must wash the developer out of the film with lime-free water, *i.e.*, distilled or rain water, before our plate goes into the fixing bath. If this cannot be obtained we can prevent precipitation by using acid water. Thus 1 dram of acetic acid or ½ dram hydrochloric acid per pint of tap water may be used. But this precaution does not always yield a perfectly bright negative.

After fixing, we must wash well to get rid of all hypo, and again use our clearing bath of double strength—*e.g.*, hydrochloric acid, 1 dram; water, 20 oz. One or two washings in plain water are sufficient after the final acid bath.

Concentrated Developer (suggested by Hauberisser) :—

A. Hot water, 3 parts; oxalate potassium, 1 part.
B. Water (cold), 3 parts; ferrous sulphate, 1 part. Enough sulphuric acid to give an acid reaction with litmus.
C. Water, 5 parts; Rochelle salt (sodium potassium tartarate), 1 part.
D. Water, 10 parts; potassium bromide, 1 part.

Add 3 parts C to 10 parts B; heat to near boiling; then add 35 parts A and 2 parts D.

Another method.—To a saturated solution of potass. oxalate add a saturated solution of ferrous sulphate until no further precipitate is thrown down. Collect and work this precipitate with cold water. Then add it to a saturated solution of potass. oxalate until no more is dissolved. Store in full bottles and keep in the daylight.

Restoring partly spent ferrous oxalate developer.—This, like all other developers, gets slower in action after each use, but unlike most, if not all other present-day developers, this diminished activity can be partly restored.

(1) Place the developer in a white glass bottle and expose to sunlight for a few days.
(2) To 250 parts developer add 1 part formalin.
(3) To 100 parts developer add 1 part tartaric acid or Rochelle salt.
(4) Add pieces of clean or freshly granulated zinc.
(5) A few drops of oil of cloves, cinnamon or peppermint have been suggested.
(6) Glucose and glycerine have been successfully used for this purpose.

Notes.—(*a*) The ferrous oxalate developer differs from the other present-day dry plate developers seeing that it is used in an acid condition.

(*b*) 1 part potassium oxalate will dissolve in 3 parts water. 1 part ferrous sulphate will dissolve in 1½ parts water.

(*c*) 278 parts ferrous sulphate (crystals) in solution react with 235 parts potassium oxalate (crystals) in solution to yield 144 parts ferrous oxalate (precipitate).

(*d*) The object of adding iron wire to the acid ferrous sulphate solution is to evolve hydrogen and so prevent oxidation of the ferrous salt.

(*e*) Using ferrous oxalate as a developer converts the ferrous into ferric oxalate which is again reconverted to the ferrous state by sunlight.

(*f*) A developer that is intended to be stored should contain:—Potass. oxalate, 40 grs.; ferrous sulphate, 8 grs.; Rochelle salt, 1 gr.; water, 1½ oz.

(*g*) This developer is particularly valuable in conjunction with stale plates which with many other developers show irridescent stains round the edges. Ferrous oxalate has very little, if any, tendency to yield these stains.

Sundry Notes.

By F. C. BURTON.

Stand development simply means standing plates on edge in a porcelain or glazed earthenware washing tank, and filling the tank with dilute developer. The plates develop slowly, the time taken depending upon the constitution and dilution of the developer. By suitably adjusting the proportions, etc., one can arrange, so that plates put into the tank may be left for an hour or more, as may be convenient. Thus the business man may start his developer at night and arrange so that the plates are developed ready for fixing next morning.

A slow acting developer has the further advantage of enabling one to deal with doubtful exposures. The way the image appears is often a clue to over or under-exposure, so that a modified developer may be applied, if desired, the slow acting developer giving one time to think and act before it is too late.

Precautions.—It is obvious, that as the plates will be standing in the developer for some time, we must have enough preservative to prevent discoloration and stain. Again, due care must be taken to use water that is as free as possible from dissolved air, or we shall probably find that soon after the plates are immersed they have tiny air bells clinging to the film. Unless these are removed they will yield clear spots in the negative. Hence in stand development it is desirable to remove each plate after it has been in the developer a few minutes, and gently wipe its film side with a tuft of cotton wool. Two plates with their uncoated backs together may, if desired, be put into each groove. If concentrated stock solutions are diluted the dilute developer should be slowly stirred with a glass rod to ensure even mixing. Care should be taken to wash out the tank before the developer is poured into it. The tank should be covered by a card lid during development.

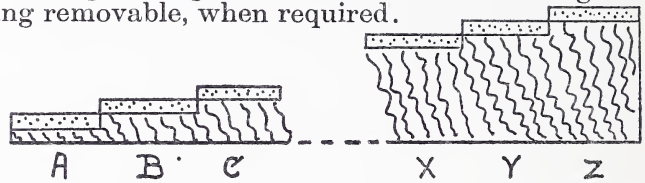
Quantity of Sulphite.—The quantity of preservative present should be proportionate to the quantity of water used. In the case of sodium sulphite this should be not less than 15, and need not be more than 20 grains per oz. of water.

Temperature.—Several plates from the same box were exposed for the same length of time under a positive by gaslight. Each plate was then cut into two equal portions. A developing solution was prepared and likewise divided into two equal portions. One portion was cooled down to 40°F. This was taken as the lowest likely temperature of the dark-room for ordinary winter work. The other half of the solution was kept at 65°F. Care was taken to keep the developing dishes at the same temperature as the solution in each case, *viz.*, 40°F. and 65°F., so that development was carried on at constant temperatures. One-half of the plate was developed for winter conditions, the other for cool summer conditions. The time of appearance of the image was noted, and this time multiplied for the same factor for total time in each case. For example, suppose one-half in the warm developer showed first appearance in half a minute development, and the developer used required a factor of 8, then development would be carried on for four minutes. Next, suppose the companion half first appeared in one minute in the cold solution, then this would be developed for eight minutes, the factor varying with the different developing agents used. Two general conclusions were drawn:—*First:* That the final results were very similar with each pair of cut plates, so that *in general*, provided we use the same factor, temperature does not materially affect the final results. *Second:* The same change of temperature made much greater difference with some agents than with others.

	First appearance at 40°F.	First appearance at 65°F.	Proportion. (approx.)
Pyro soda.....	2 mins.	1 min.	2 : 1
Ortol	3 ,,	35 secs.	5 : 1
Quinol	11 ,,	2 mins.	5½ : 1
Metol-Quinol.	15 ,,	5 ,,	3 : 1

It was further noted that a few degrees below 40°F. quinol became so slow as to be put out of court for practical work. These matters are important for the tyro to bear in mind, lest he fail to note that the tardiness of appearance of the image *may* be due to temperature, and not errors of exposure, development, etc.

Fog.—Some workers fancy that a slight amount of fog improves the printing quality of the negative. But the same effect can be obtained by covering a fogless negative with a sheet of tissue paper or ground glass. This has the advantage of being removable, when required.



The general effect of fog is to reduce contrast, and this affects the shadow detail more than the high-lights. Suppose A, B and C to represent the thin (shadow) part of a negative, and X, Y, Z the highest lights. If to the whole negative we add a fog layer equal to that in thin part A, we can see that this layer F reduces the contrast or relative difference of A and B more than it does of Y and Z.

Fog is often a characteristic (or defect) of the plate rather than the developer. It may not put in its appearance so soon with some developers, as with others.

General fog or lack of brilliancy.—(1) This may be due to a slight haziness in the atmosphere, not enough to be visible to the eye, but just enough to affect the plate. (2) Another common cause is the use of a lens admitting a wide cone of light. Some of this falling on the bellows of the camera is scattered and reflected on to the plate. (3) The surfaces of the lens may be slightly dirty and so scatter light. (4) Some part of the lens fitting, tube, hood, edge of stops, which may have worn smooth and shiny and so act as reflectors.

Dead black for stopping reflections.—On the back of a dinner plate put a 'dab' of drop black or a teaspoonful of ebony black or lamp black; add a few drops of ordinary negative or shellac varnish to the consistency of butter in summer. Rub thoroughly to smooth paste with an old knife. Then dilute with turpentine and apply with a brush. Use only just enough turpentine to counteract the shine of the varnish, and give a dead drying dull black matt surface.

Developing and Fixing in one (combined) operation. It is obvious that the plate must remain in the bath until it is properly fixed. Hence it is essential for success that development should be complete at the moment when the plate is removed, otherwise the errors of under or over-development must be present. The various components of the bath must therefore be adjusted so as to make the two operations of fixing and developing not only simultaneous, but also conterminous. The exposure must be ample without being excessive. A formula which may suit one brand of plates may not suit any other make. The softness, absorption powers, thickness of gelatine, quantity of silver haloid, etc., vary materially in different brands.

Formalæ:—

(1). Water, 10 ozs.; hypo, ¾ oz.; caustic potash, 100 grs.; kachin, 100 grs.; soda sulphite, 1 oz.

(2) Water, 60 parts; soda sulphite, 5 parts; kachin, 1 part; caustic potash, 1 part; hypo, 5 parts.

(3) Water, 10 ozs.; hypo, 2 ozs.; soda sulphite, 1 oz.; soda carbonate, 1 oz.; soda caustic. 100 grs.; edinol, 75 grs.

Development after Fixing.—For this experiment the plate preferably may be a slow rather than a rapid one, and the exposure generous. The plate after exposure is placed in an ordinary hypo fixing bath for, say, ten minutes. It is then rinsed in water for say five minutes. No image is visible at this stage. Development of the invisible image may take place in subdued gaslight. The developer is prepared thus: Stock Solution—Water, 1 oz.; silver nitrate, 50 grs.; when dissolved add ammonium sulphocyanide, 120 grs. This throws down a precipitate. Now add a 20 per cent solution of hypo, drop by drop, until the precipitate is just redissolved. For a developer take stock solution, ½ oz.; soda sulphite, 10 grs.; ammonium bromide, 2 grs.; pyro, 3 grs.; water, ½ oz.; ammonia, 3 mins. If the image does not begin to show in two minutes add 1 min. of ammonia and so on at the end of each minute until development begins.

Development During and After Fixing at present are interesting laboratory experiments rather than workroom practical procedures.

Metol—Skin Troubles. This reagent has one black mark against its use, *viz.*, its tendency to set up a painful skin trouble. And unfortunately when once this has happened with an individual it is very apt to recur if metol be used again. Therefore if the reader happens to be one of the comparatively very few people affected by metol in this way, the course is to abandon its use, or use rubber finger stalls.

Symptoms.—Skin intensely cold and dry with a feeling of tenderness and swelling, followed by a pimple rash. Subsequently the skin peels off leaving sensitive and sore places, which may refuse to heal for some time.

Treatment.—At once abandon the use of metol. Wash with coal tar soap. Avoid touching alkaline solutions. Attend to the general health, taking plenty of outdoor exercise, simple foods, avoid stimulants and guard against constipation by free use of fruit and vegetables. Lay aside condiments, pickles, curry, etc.

Ointments.—The following have their various supporters.

(1) Pix liquida (tar).
Oleum rusci (oil of white betula).
Oleum cadini (oil of cade or juniper tar oil).

Of each take one part and dissolve in three parts alcohol. Apply to the skin with gentle rubbing each night. Any stain of the skin may be removed by rubbing with a tuft of cotton wool moistened with turpentine.

(2) Citrine ointment, ½ drm.; carbolic acid, 10 min.; zinc oxide, 1 drm.; lanoline, 1 oz.; ichthyol, 10 grs.

(3) Ichthyol, 1 part; lanoline, 2 parts; vaseline, 3 parts; boracic acid, 4 parts.

(4) Carbolic acid, 1 drm; coal tar soap, ½ oz.; glycerine, ½ oz.; water, 10 ozs.

(5) Liq. carbonis deterg., 1 drm.; hydrarg. ammon. chlor, ½ drm.; lanoline, 3 ozs.; vaseline, 6 ozs.

The metol disorder seems to be related to eczema, and people affected by the latter are especially liable to the former.

Quinol skin troubles have been mentioned in the photographic press and described as being similar to those produced by metol and amenable to the same line of treatment.

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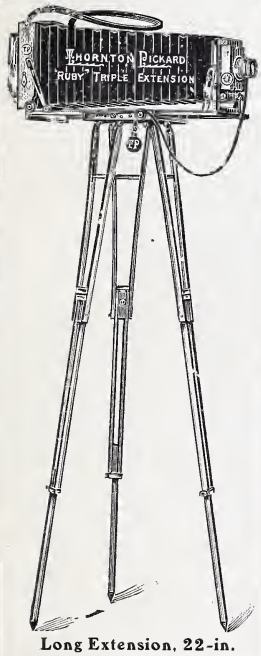

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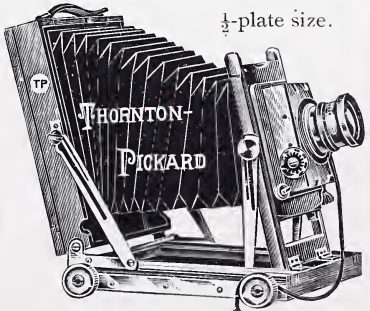

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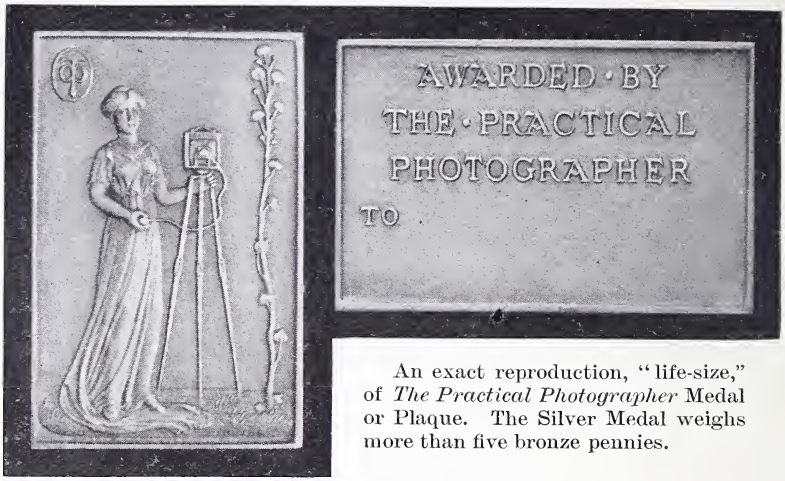


An exact reproduction, "life-size," of *The Practical Photographer* Medal or Plaque. The Silver Medal weighs more than five bronze pennies.

A glance at the reproduction here given of our much coveted and universally admired medal will show that the design has relationship with that on our cover especially drawn for us by the eminent artist, Mr. George Walton. The modified design has been admirably executed for us by Mr. Bladon, to whom we now very heartily offer our congratulations and thanks for the painstaking and skilful manner in which he has engraved the die.

The figure symbolises the Art and Science of Photography. Her classic robes, characterized by gracefulness of line and simplicity of arrangement, betoken the Art and Science as clothed in Grace and Simplicity. She stands firmly on the ground of Truth. From the same terra firma springs the upward-seeking tree of Ambition. Its straightness suggests Singleness of Purpose and Directness of Aim, which in due time bring forth the flowers and fruit of Consistent Endeavour.

In the left upper corner is our own little cartouche or monogram design, blending the letters, T(he) P(ractical) P(hotographer).

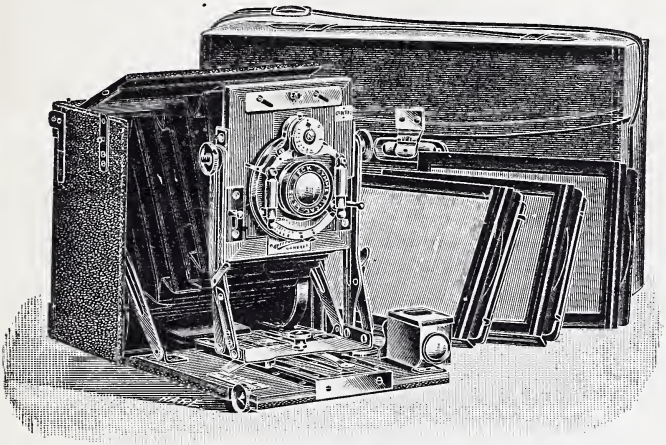
We also gladly take this opportunity of thanking the various medal winners for their patient waiting while the medals have been prepared, and are gratified to find that the recipients appreciate these tokens of their success. In writing to acknowledge the safe arrival one says: "*It is a real beauty.*" Another remarks: "*I am very pleased indeed with it; it is a splendid design.*" The next says: "*It is really most beautiful.*" A fourth writer: "*I am very pleased with it and must congratulate you on the beautiful design. It is not only a credit to the designer but also to 'The Practical Photographer.'*" Yet another, whose ambition we are glad to encourage, writes: "*It far exceeded my expectations both in design and shape, and I hope it will not be the last that I shall win from 'The Practical Photographer.'*"

Our Certificate is also of novel and chaste design. It is printed in rich black old English lettering with red initials, on fine Japanese vellum. One recipient writes: "*I consider it the most artistic and suitable design I have ever seen.*" Another—but space permits no more of these most kind remarks, for which we very gratefully thank the writers.

Messrs. A. E. Staley & Co. are removing from Aldermanbury to 19, Thavies' Inn, Holborn Circus, where they will have some handsome and commodious premises on six floors.

A Shutter Speed Tester reaches us from the Infallible Meter Company. This neat little bit of apparatus consists of a rocking pendulum with moving "bright spit" against a ruled diaphragm. We are looking forward with some interest to making a few experiments, which we hope to report in these columns shortly.

THE 'Sanderson' HAND CAMERAS.



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A New Bromide Paper.—At the moment of going to press we have received from Messrs. Elliott & Sons a package of "Lustra Matt" Bromide Paper. In our next issue we hope to be able to report the result of a few experiments with this new brand.

Messrs. Elliott & Sons have sent us a sample of some especially rapid plates which we hope to test and report upon "in our next."

We have received a sample of **Aquaglue,** which is said to dry quickly, hold fast and stand water. We purpose putting it to some dark-room tests, *e.g.*, mending broken dishes, and report results at an early date.

The Alphengo Enlarging Lantern.—We have recently had an opportunity of thoroughly inspecting Hughes' latest optical contrivance, called Alphengo, and can give it our unqualified approval. Virtually it consists of a metal body holding two (or more) lamps (oil, gas, electric, etc.) which by suitable reflectors give a fine even illumination either to a transparent object such as a negative, or an opaque object, *e.g.*, a geological specimen. No condensers are used. For enlarging, reducing, etc., an adjustable platform holds one's ordinary camera in front of the negative. The apparatus can be got ready in a few moments. It is available for copying, drawing, etc. In short, one may call it "The Amateur's Friend" for copying, demonstrating, reducing or enlarging. It only needs to be known in order to be appreciated.

From Messrs. Elliott & Sons, Barnet, we have received samples of P.O.P. post cards; so that the P.O.P. post card printer is thereby saved all the trouble of mounting his prints. This is an entirely happy idea which has only to be mentioned in order to be appreciated. These handy cards may be had in two grades, *viz.*, glossy and matt. The procedure (washing, toning, fixing, etc.) is exactly the same as with the usual thickness of P.O.P. These cards are put up in convenient 6d. packets.

The Watkins' Meter Company, Hereford, are issuing a "Queen Bee Meter" of careful finish and refined appearance. This is not put forward as the "cheapest," but as the nicest and best watch-shaped meter obtainable. The various exposure meters issued by this firm are too well known to need description. We may rest assured that the new issue will fully maintain the high standard of this enterprising firm.

The 1903-4 Price List of Photographic Apparatus and Materials issued by **George Houghton & Sons,** and sent post-free for 1s., is indeed a comprehensive work. It will test the patience of any one to detect the omission of any really useful or needful article, so comprehensive is its scope. The buyer has put before him a wide choice in each case. For instance, there are over a score forms of dark-room lamps from 1s. upwards. The book also contains an admirable list of useful chemicals. Another year we should be glad to see this section put either at the beginning or end of the book for the greater convenience of frequent reference.

Formosulphite, a white powder dissolving readily in water. It serves the double purpose of preservative and alkali or accelerator, *i.e.*, replacing soda sulphite and carbonate, for instance. It keeps well in powder and solution. It exerts a hardening effect on the film and therefore is preferable for hot climates to such alkalis as caustic soda, etc., which soften the gelatine. At normal temperature 1 part of formosulphite is dissolved in 3 to 4 parts water.

One formula will serve as a type:—Water, 100 parts; formosulphite, 9 parts; pyro, 1 part. This gives a developer ready for use. Potass. Bromide or other restrainer may be added as required.

The Kodak Developing Machine is one of the many contrivances which go to make photography a luxury. For a 5×4 or smaller sized spool the case is rather less than a lady's work-box. The daylight loading film is put into position at one end; an orange celluloid coiled film attached; the developer poured in, the lid shut down and a handle steadily turned for, say, 4 to 5 minutes. The lid is now removed just far enough to permit the used developer being poured away and its place taken by a fixing bath. Another four or five minutes' turning of the handle and the box, now opened, gives us our dozen negatives developed and fixed, and only requiring washing free of hypo by any of the usual methods. Here, then, we have the convenience of a dark-room without any of its usual discomforts, and in so portable and compact a form that the tourist need not hesitate to add it to his kit.

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Our Lantern Slide Competition was somewhat of a disappointment as regards the number of entries, considering the large number of slide makers. Possibly the Christmas holidays had something to do with the fatal delay which brought in several sets a day or two behind time, and therefore too late for the race. The general quality was remarkably even and well above average.

Award :—Silver Medal: **A. Nicholson,** Bronze Medal: **R. A. R. Bennett.** Certificate: **T. R. Somerford.** , Extra Certificate for set of framed slides: **S. Swinden.** Extra Certificate for uniformity of quality: **R. Barritt.** Highly Commended: **J. B. Anderson, A. E. Pickering, W. H. Nithsdale, W. B. Topping, A. Turner, S. E. Fincham, J. Swan, J. Ludlam, J. J. Rutherford, W. Riley.**

Lantern Slide Criticisms.

A. Nicholson.—"Cloisters." Just a trifle too much clear glass. Doorway. Picture not quite upright. In both cases the opposite sides of the mask opening not quite truly parallel. General quality and colour excellent. In architectural subjects the building should be very carefully placed on the slides. If the outline of the opening is not cut true it may make the building look wrong. Developers for slides: 1. Pyro ammonia; 2. Quinol.

R. A. R. Bennett.—Three figure studies. Best slide entitled "Ominous Clouds." Girls' aprons too much clear glass. Small bit of sky should be toned down, as it competes with the more important high-lights of picture. Tone-colour of other two better than first, but composition of figures not so unconscious. Clouds nicely adjusted. A general tendency to slight over-accentuation ot light and shade contrasts. Delicacy is better than brilliancy in slides for pictorial effect.

T. R. Somerford.—A set of praiseworthy slides. Uniformity of character, and in the case of two slides also admirable simplicity of subject and effective arrangement. One slide is weak by reason of the too symmetrical arrangement. Tone colour good, obtained by the quinol and am. carbonate developer (exposure, 4 min. by daylight-reduction, stop not mentioned). A slight tendency towards over-development.

S. Swinden.—Three framed slides, calling for congratulations on good average quality. A somewhat darker background behind the frames would be a vast improvement. Do not have your frames coming quite so near the margins of the binder strip. At present your frames look a *little* too large for the slide space. *Vide* fig. 32, *The Practical Photographer* No. 3. Do not exceed these proportions. With a little more practice you will get a still better fit of picture and frame.

R. Barritt.—Your set of three flower studies was the most uniform in quality of all the sets sent in. In each case your subjects are a little too large for the picture space. This tends to make the flowers seem unnaturally large. Your working details are also the most complete and practical of any sent in. We therefore quote them for guidance of others. "Made by reduction from ½-plate negatives, placed against ground glass in window, and reduced by daylight. 2 p.m., January; good steady light, *f*/16; exposed 1½ minutes; developed with A and B formulæ on page 12, *The Practical Photographer* No. 3. Slides bleached with mercuric chloride, and darkened with dilute ammonia. Seed lantern plates." Colour is quite suitable. The uniformity of quality and evident systematic care is a sure sign of this worker steadily improving. A little more care needed to avoid dust specks. Be very careful about cutting the edges of your masks.

Pinakol P. is the mysterious name of a concentrated solution of Pyro merely requiring diluting with eight volumes of water to yield a steadily acting developer, which stains neither plates nor fingers, and gives good quality negatives of a neutral black colour. With a full exposure and three or four drops of a 10 % solution of Potass. Bromide per oz. diluted developer, we get a warm black tone with lantern slides. Bromide slows the action, as also does a low temperature. The same lot of developer may be used for a second negative.

Pinakol Salt N. is designed to take the place of the usual alkalis in developing solutions. It does not affect the skin or gelatine. Usually we require 10 parts Pinakol N for 1 part pyro, or 15 parts Pinakol N with 1 part glycin. Thus roughly we may state that one part Pinakol is equivalent to two parts Potash or Soda Carbonate. Messrs. Fuerst are agents for these very convenient and useful preparations.

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½-page do.	1 10 0	1 8 6	1 7 0	1 5 6
¼-page do.				
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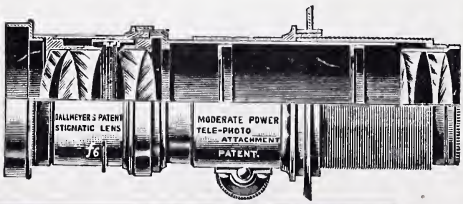

Print Criticism Prizes.—The following have taken the prizes of five shillings each:—**Miss Ford** (Wilmslow), Winter Landscape; **S. R. Somerford** (Brixton), South Aisle, Ely; **W. H. Mack** (Runcorn), Swans. Two more five shilling prizes have been equally divided between **J. A. Dickie** (Norden), **E. Hoppe** (Maida Vale), **R. Robinson** (Newark), **J. H. Saunders** (Burmantofts), in consideration of their very close approximation to the prize prints.

S. R. Somerford.—"South Aisle, Ely" (Edwards' Iso Snapshot, June, 2-35, exposure: 5 min. with *f*/16 and 15 min. with *f*/32, sepia platino). This is an interesting example of a method of using two different stops during an exposure, suggested by the Editor of this journal some twelve or fifteen years ago. To impress the plate with *detail* a small stop is first used (say in this case *f*/32 and 15 min. exposure given), then the lens capped, the stop changed for a larger (in this case, *f*/16) one, great care being taken not to disturb the position of the camera, and a further exposure (5 min.) given. Advantages: The small stop gives us a certain degree of detail not possible with the larger stop. The larger stop gives brilliancy not possible with the small stop. The total time is less than if the exposure had been made with the small stop only. In the above case a total time of 5 plus 15 minutes given. But 5 min. with *f*/16 is equivalent to 20 min. with *f*/32. So that the total time with *f*/32 would have thus been 15 plus 20, or 35 minutes. Fig. 30.

W. H. Mack.—"Swans." This title belongs to the order of the fairly obvious. Why not try something like, "A Stately Pair," "Companions of the Bath?" The original print is an excellent bit of bromide printing, rough surface paper. Negative, June, sunlight, *f*/16, exposure 1/25 sec., rapid plate. The long narrow shape of the print is quite appropriate to the subject. The balance of arrangement demands a little more space in front of the birds. Fig. 19.

Miss Ford.—"Winter." We hasten to explain that the author gives us no title, so we have tacked on this merely as an identifying label. But one can imagine half a score good titles being found with a little thought. The reproduction does not do this print full justice. We must therefore ask the reader to image an exceptionally delicate rendering of snow and haze-hidden distance. February, noon, good light, Ilford Ord., open stop, ½ sec., are the details given. Fig. 31.

R. Robinson.—"White Roses." (Platona print, Negative made August, in room near window; good light, rapid plate, *f*/16, exposed 30 sec.) An excellent example of how a very charming picture may be made from the simplest subjects such as one may find in any garden. Chief fault here is the background being not quite dark enough to give full tone value to the white flowers. Fig. 28.

J. H. Saunders.—"Feeding the Poultry." (June, 2-30; plate 64 Wynne, *f*/11, exposure 1/25 sec., Venus P.O.P.) A very successful bit of work in all respects. Readers should note how much this picture owes to the admirable suggestion of clouds. There is one matter to find fault with, viz., the way that the top bar of the gate cuts off the head of the girl. It would also be improved by getting the left lower corner a trifle darker. Fig. 29.

J. A. Dickie.—"On Lake Windermere." An excellent example of careful border printing. The sky and distance are admirably suggested in the original, but somewhat lost in the reproduction. The chief fault here is that there is not enough space in front of the boat, which consequently looks as though it were just slipping out of the picture. There should be rather more space in front than behind a moving object. Fig. 32.

E. Hoppé.—"The Violinist." (Warwick plate, December, 11 a.m., in a room, 7 sec. exposure.) Particularly interesting as showing the possibilities of dealing with simple subjects. A courageous and successful breaking away from the usual "sitter facing camera" pose. In the original the chief defect is a sharp strong white line along the top of the chair back, which we have purposely greatly subdued in the reproduction. The figure is a little too near the centre of the picture. Fig. 33.

Will Readers please bear in mind that the colour of our reproductions does not necessarily represent that of the original picture. When selecting the prize prints from among those which are submitted for criticism we pay special attention to originality, either in selection or arrangement of subject, and its treatment; care in printing, trimming, mounting, titles, and, in fact, all those little matters which indicate earnestness on the part of the worker.

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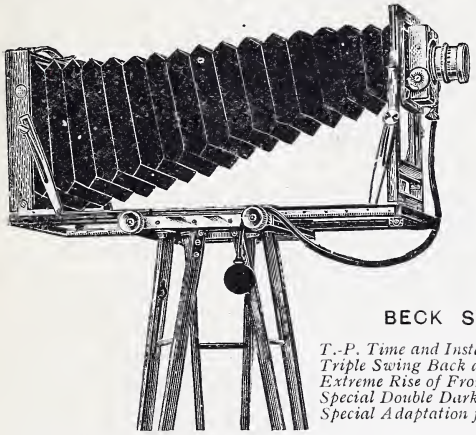

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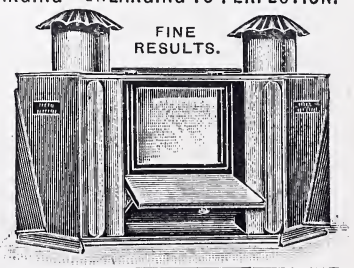

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Print Criticisms.

W.T.S. (Wolverhampton).—You are making a sad mistake by using such fanciful mounts. Study carefully our Number 4.—Avoid white mounts. *Portrait.* This is your best print, and is very promising work. Do not vignette unless you have some very strong reason for so doing. Other two parts are too strong in contrast, too black and white. For your print developer use the Metol formula (No. 2) given in our Volume No. 1, and dilute it with equal quantity of water.

H.B.C. (Kingswinford).—An excellent print which was *very* nearly being a prize winner. Do not use ink for writing title on mount (see number 4 of present series) and do not use such flimsy mounts. If you paste your print down to mount, the mount itself should first be stiffened by pasting on to stout card.

E. T. R. (Cranlington).—Your work is steadily improving. Do not use ink for titling. Study No. 4 of present series as to mounting and titles. Your "Wood Sawing" is excellent, but needs sky toning down a little. The "Clog Sole Maker" is too mixed up with the background. The near tree trunk should have been omitted. "Ruts," etc.—Too much foreground, *i.e.*, camera should have been lower. Sky part nicely suggested. You are slightly under-exposing generally.

C. G. (Balsall Heath).—Your boy fishing nearly landed you a small prize. Boy's hat too white (rub down negative with rag and methylated spirit). Sky part, though small, is too like paper, not enough like atmosphere. Tower picture seems overcrowded; too much subject for picture space. The near trees compete with the tower for one's attention; one or other should be the more important. You can't have two captains on one ship.

J.B.A. (Belfast).—You mention two prints, but your package only contained one, which is very nice in every way *except* the blank white paper sky. Your exposure was dangerously near to under-exposure. Better to err slightly in the other direction. Your picture would have been improved by using a larger stop and putting the distant foliage slightly out of focus.

A. E. (Bristol).—One of the most difficult things in photography is to get a really satisfactory harmony of colours of print and mount. Therefore it is far wiser and more satisfactory in 99 per cent. of cases to aim at contrast effects. Your print, which is well above average quality, is not shown to advantage on the competing green mount. Moreover the narrow light band is too light, for it catches the eye at once. Study carefully pp. 17-23 in *The Practical Photographer*, No. 4.

R. L. (Castlemartyr).—1. Much too harsh and strong contrast. 2. Far better, but a shiny surface does not suit the subject at all. 3. This is the best. It is a little too hot in colour for the subject. (Though small, the mounts should have been stiffened by pasting to card). In 3, the central dark tree comes rather too near the centre for good decorative arrangement. Your work shows very healthy signs of improving pictorial taste.

J. J. R. H. O. (Chesterfield).—It is very seldom indeed that a circular picture composes well, and especially in the case of architecture or landscape. You have got a good deal of halation in your negative where the sky obliterates the upper part of the foliage. This is due to not using a backed plate, over-exposing and over-developing. No remedy now. Adopt a simpler style of mounting.

T. W. (Birmingham).—The reason why the roadway seems too wide and out of proportion is two-fold: First, the use of a very short-focus lens; secondly, the camera was too high up from the ground. The portrait is very fair, but the expression is too conscious. Give your sitter a book to read or something to look at, and engage him in conversation until the conscious expression subsides, then make the exposure.

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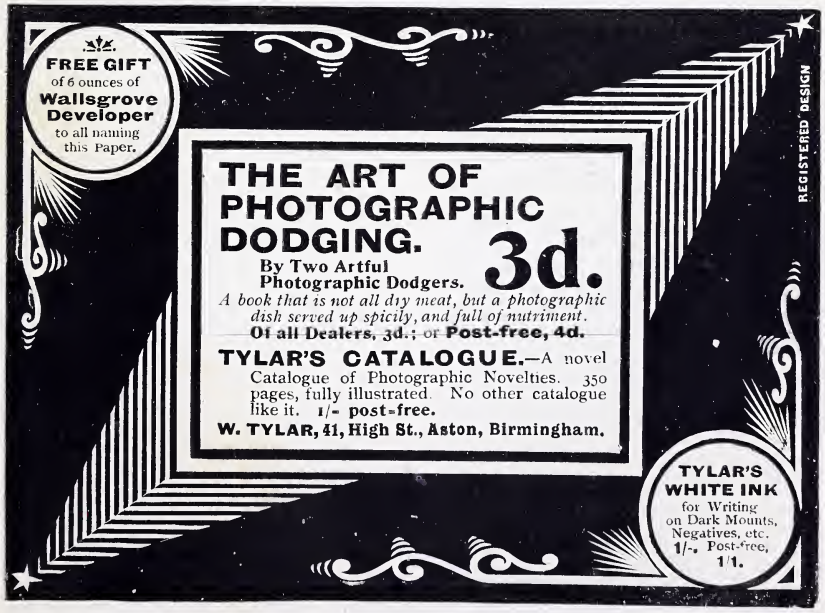
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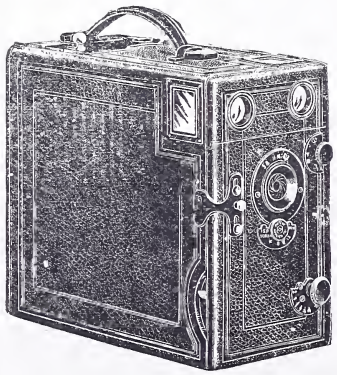
The Art of Photographic Dodging (price 3d.) is the title of a booklet received from Mr. W. Tylar, High Street, Aston, Birmingham. This consists of a handy catalogue of the many useful photographic sundries that one has only to see and then to want. On each page is a column of hints and notes in what we may call the famous Tylarian style, *e.g.*, "If you mount your prints in albums your friends will not clamour for them." "Don't be content with mediocrity." "After rain the actinic power of the light is nearly as quick again." It is a useful and amusing threepennyworth.

The Rotary Photographic Company desires us to intimate to all and sundry that in consequence of the immense number of prints entered for the Rotox competition they will not be able to publish the award list before a fortnight or three weeks hence.

Knowledge and **Illustrated Scientific News** are now published under one cover (6d.) and form a happy combination. Number 1 deals with Ancient Calendars, Motor Æroplanes, Miniature Suns, Oyster Fisheries, Ancestry of Elephants, etc. The new series has our very hearty good wishes.

At the Regent Gallery, 99, Regent Street, may now be seen an interesting and instructive collection of examples of Luna prints both on paper, silk and linen. Examples are shown illustrating the wide range of tones from warm sepia red to platinum black. The visitor who is free to inspect this collection on presentation of visiting card, should not fail to notice some particularly interesting examples of the use of Luna prints on fabrics tastefully made up as parts of fans. This will doubtless serve as a useful hint for the worker who is tired of post card or album prints. One of the striking features about Luna paper is that the sensitive emulsion is inside the fibre of the paper so that it may be printed on *either* or indeed on both sides. The Luna Company are organizing a competition, and offering money in prizes. Full particulars will be sent post-free to anyone writing to Lucien Allegrè & Co., 59a, New Oxford Street, W., and mentioning *The Practical Photographer.*



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P.S.—For description of Prize Camera, see p. xi.

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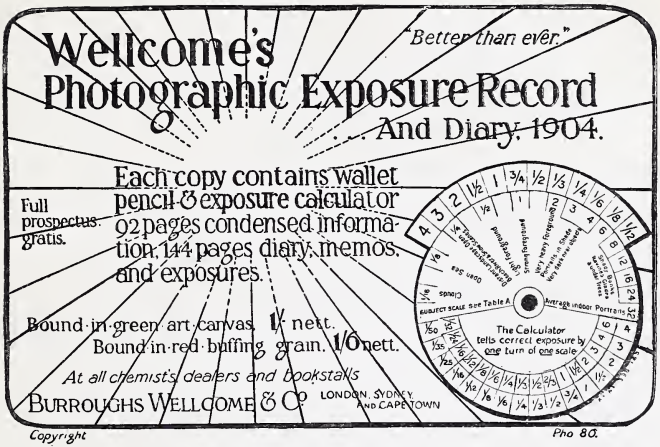
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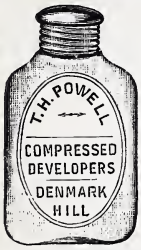

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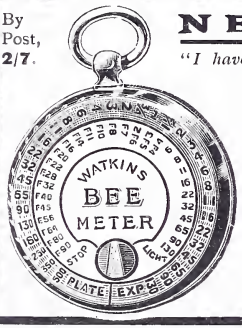

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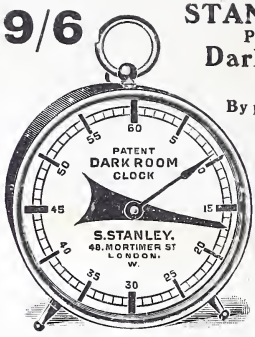

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